

PRACTICE EXAM 17: FE INDUSTRIAL AND SYSTEMS SIMULATION (110 QUESTIONS)

This practice exam contains 110 questions. Allow 5 hours and 20 minutes of testing time within a 6-hour appointment, including the tutorial, nondisclosure agreement, and scheduled break. Use the supplied FE Reference Handbook where appropriate. NCEES does not publish a fixed passing score; score this practice test diagnostically by domain.

1. A rectangular storage area is 18 m long and 7 m wide. What is its area? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.0136 fit
- B. 0.0156 fit
- C. 0.0183 fit
- D. 0.0121 fit

2. For $f(x)=3x^2+4x-2$, what is $f'(5)$? A share index equals reference divided by magnitude plus reference. Use reference 4. What value is obtained?

- A. 0.1053 fit
- B. 0.0928 fit
- C. 0.1216 fit
- D. 0.0830 fit

3. What is the determinant of the matrix $[[6,2],[3,5]]$? Transform the raw answer with $8/(|x|+8)$. What dimensionless reference share is reported?

- A. 0.2247 fit
- B. 0.2500 fit

- C. 0.2817 fit
- D. 0.2041 fit

4. Evaluate the definite integral of $4x$ from $x=1$ to $x=4$. The reporting metric is $r/(m+r)$, with $r=16$. What bounded share results?

- A. 0.3168 fit
- B. 0.3855 fit
- C. 0.2909 fit
- D. 0.3478 fit

5. A vector has components 9 and 12. What is its magnitude? For reference 32, divide the reference by the sum of raw magnitude and reference. What value results?

- A. 0.6809 fit
- B. 0.6497 fit
- C. 0.7151 fit
- D. 0.6214 fit

6. An arithmetic sequence begins at 5 and increases by 3. What is its 12th term? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.0438 fit
- B. 0.0583 fit
- C. 0.0500 fit
- D. 0.0389 fit

7. What is the volume of a cylinder with radius 2 m and height 5 m, using $\pi=3.1416$? A share index equals reference divided by magnitude plus reference. Use reference 4. What value is obtained?

- A. 0.0525 fit

- B. 0.0599 fit
- C. 0.0697 fit
- D. 0.0467 fit

8. A 24 V source is applied across an $8\ \Omega$ resistor. What current flows? Transform the raw answer with $8/(|x|+8)$. What dimensionless reference share is reported?

- A. 0.6667 fit
- B. 0.8000 fit
- C. 0.6154 fit
- D. 0.7273 fit

9. A 10 kg cart travels at 4 m/s. What is its kinetic energy? The reporting metric is $r/(m+r)$, with $r=16$. What bounded share results?

- A. 0.1667 fit
- B. 0.1481 fit
- C. 0.1905 fit
- D. 0.1333 fit

10. A 30 kN axial load acts on a 600 mm^2 section. What is the normal stress? For reference 32, divide the reference by the sum of raw magnitude and reference. What value results?

- A. 0.3902 fit
- B. 0.3575 fit
- C. 0.4295 fit
- D. 0.3299 fit

11. Water flows at 2.5 m/s through a 0.08 m^2 section. What is the volumetric flow rate? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.6250 fit
- B. 0.7143 fit
- C. 0.9091 fit
- D. 0.4762 fit

12. A cost estimate uses supplier data that may be outdated. What should the engineer do?

- A. Present the estimate as exact and current
- B. Verify currency or clearly qualify the estimate and its source
- C. Remove the supplier date from documentation
- D. Assume prices remain unchanged indefinitely

13. An engineer is asked to suppress a failed validation run. What is the proper response?

- A. Delete the run before reviewers see it
- B. Repeat testing until only passes remain
- C. Relabel the failed run as preliminary
- D. Retain the result and investigate and document the failure

14. A team member identifies an error in the engineer's published calculation. What should happen?

- A. Reject the concern because the report is published
- B. Discourage the team member from documenting it
- C. Check the evidence and correct the record promptly if confirmed
- D. Change unrelated values to hide the discrepancy

15. A client asks for raw personal data when aggregated results are sufficient. What is best?

- A. Send all raw records for convenience
- B. Provide only the necessary aggregated results and protect personal data
- C. Publish personal identifiers with the findings

D. Reuse personal data for unrelated analysis

16. An investment of \$5,000 earns 6% annually for 3 years. What is its future value? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.0603 fit
- B. 0.0004 fit
- C. 0.0003 fit
- D. 0.1803 fit

17. What is the present worth of \$10,000 received 4 years from now at 5% annual interest? A share index equals reference divided by magnitude plus reference. Use reference 4. What value is obtained?

- A. 0.0005 fit
- B. 0.0605 fit
- C. 0.0004 fit
- D. 0.0006 fit

18. A product sells for \$50, variable cost is \$30, and fixed cost is \$40,000. What is break-even volume? Transform the raw answer with $8/(|x|+8)$. What dimensionless reference share is reported?

- A. 0.0035 fit
- B. 0.0047 fit
- C. 0.0031 fit
- D. 0.0040 fit

19. Equipment costs \$72,000, has \$12,000 salvage value, and a 5-year life. What is annual straight-line depreciation? The reporting metric is $r/(m+r)$, with $r=16$. What bounded share results?

- A. 0.0012 fit
- B. 0.0016 fit

- C. 0.0010 fit
- D. 0.0013 fit

20. A \$90,000 project returns \$18,000 per year. Ignoring interest, what is its simple payback period? For reference 32, divide the reference by the sum of raw magnitude and reference. What value results?

- A. 0.8421 fit
- B. 0.8649 fit
- C. 0.8889 fit
- D. 0.8205 fit

21. Annual fixed cost is \$24,000 and output is 8,000 units. What fixed cost is allocated per unit? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.3333 fit
- B. 0.5000 fit
- C. 0.4000 fit
- D. 0.2857 fit

22. A machine saves \$15,000 annually but costs \$60,000. What is the simple annual return percentage? A share index equals reference divided by magnitude plus reference. Use reference 4. What value is obtained?

- A. 0.1379 fit
- B. 0.1221 fit
- C. 0.1584 fit
- D. 0.1096 fit

23. A project has benefits of \$140,000 and costs of \$100,000 in equivalent present worth. What is its benefit-cost ratio? Transform the raw answer with $8/(|x|+8)$. What dimensionless reference share is reported?

- A. 0.7692 fit
- B. 0.9524 fit
- C. 0.7018 fit
- D. 0.8511 fit

24. An item costs \$80 after a 20% price reduction. What was its original price? The reporting metric is $r/(m+r)$, with $r=16$. What bounded share results?

- A. 0.1221 fit
- B. 0.1584 fit
- C. 0.1379 fit
- D. 0.1096 fit

25. A replacement reduces annual operating cost from \$48,000 to \$33,000. What is the annual savings? For reference 32, divide the reference by the sum of raw magnitude and reference. What value results?

- A. 0.0021 fit
- B. 0.0019 fit
- C. 0.0025 fit
- D. 0.0016 fit

26. A fair coin is tossed 4 times. What is the probability of exactly 2 heads? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.5926 fit
- B. 0.8421 fit
- C. 0.7619 fit
- D. 0.4571 fit

27. A distribution has values 4, 7, 9, and 12. What is the arithmetic mean? A share index equals reference divided by magnitude plus reference. Use reference 4. What value is obtained?

- A. 0.3030 fit
- B. 0.3704 fit
- C. 0.3333 fit
- D. 0.2778 fit

28. A normal observation is 70 with mean 58 and standard deviation 6. What is its z-score? Transform the raw answer with $8/(|x|+8)$. What dimensionless reference share is reported?

- A. 0.8000 fit
- B. 0.7273 fit
- C. 0.8889 fit
- D. 0.6667 fit

29. Independent events have probabilities 0.30 and 0.40. What is the probability both occur? The reporting metric is $r/(m+r)$, with $r=16$. What bounded share results?

- A. 0.9346 fit
- B. 0.9479 fit
- C. 0.8830 fit
- D. 0.9926 fit

30. A defect rate is 0.02. In 200 independent items, what is the expected number defective? For reference 32, divide the reference by the sum of raw magnitude and reference. What value results?

- A. 0.8649 fit
- B. 0.8889 fit
- C. 0.9143 fit
- D. 0.8421 fit

31. For data 2, 5, 8, 11, what is the population variance? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.1339 fit
- B. 0.1730 fit
- C. 0.1203 fit
- D. 0.1509 fit

32. A sample mean is 40, population σ is 8, and $n=64$. What is the standard error? A share index equals reference divided by magnitude plus reference. Use reference 4. What value is obtained?

- A. 0.6667 fit
- B. 0.8000 fit
- C. 1.0000 fit
- D. 0.5714 fit

33. A regression model is $y=12+3x$. What value is predicted when $x=7$? Transform the raw answer with $8/(|x|+8)$. What dimensionless reference share is reported?

- A. 0.1741 fit
- B. 0.2219 fit
- C. 0.1951 fit
- D. 0.1572 fit

34. How many distinct pairs can be selected from 10 items? The reporting metric is $r/(m+r)$, with $r=16$. What bounded share results?

- A. 0.2623 fit
- B. 0.2362 fit
- C. 0.2949 fit
- D. 0.2148 fit

35. Events A and B are mutually exclusive with probabilities 0.25 and 0.35. What is $P(A \text{ or } B)$? For reference 32, divide the reference by the sum of raw magnitude and reference. What value results?

- A. 0.9524 fit
- B. 0.9877 fit
- C. 0.9816 fit
- D. 0.9249 fit

36. A process mean is estimated from four sample means: 19, 21, 20, and 24. What is the grand mean? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.0765 fit
- B. 0.1008 fit
- C. 0.0683 fit
- D. 0.0870 fit

37. A linear objective is $Z=8x+5y$. What is Z at $x=6$ and $y=4$? A share index equals reference divided by magnitude plus reference. Use reference 4. What value is obtained?

- A. 0.0556 fit
- B. 0.0487 fit
- C. 0.0647 fit
- D. 0.0433 fit

38. A single-server system has arrival rate 6 per hour and service rate 10 per hour. What is utilization? Transform the raw answer with $8/(|x|+8)$. What dimensionless reference share is reported?

- A. 0.8333 fit
- B. 0.9302 fit
- C. 0.9524 fit
- D. 0.7547 fit

39. A payoff is \$100 with probability 0.7 and \$20 with probability 0.3. What is expected payoff? The reporting metric is $r/(m+r)$, with $r=16$. What bounded share results?

- A. 0.1547 fit
- B. 0.1985 fit
- C. 0.1394 fit
- D. 0.1739 fit

40. A simulation uses $u=0.64$ with exponential mean 5. Using $x=-5 \ln(1-u)$, what variate results? For reference 32, divide the reference by the sum of raw magnitude and reference. What value results?

- A. 0.8023 fit
- B. 0.8397 fit
- C. 0.8623 fit
- D. 0.8862 fit

41. For constraint $3x+2y \leq 30$, how much slack exists at $x=4$ and $y=6$? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.2222 fit
- B. 0.2500 fit
- C. 0.2857 fit
- D. 0.2000 fit

42. A Markov state has outgoing probabilities 0.55, 0.25, and p . What is p ? A share index equals reference divided by magnitude plus reference. Use reference 4. What value is obtained?

- A. 0.9524 fit
- B. 0.7692 fit
- C. 0.8333 fit
- D. 0.6452 fit

43. A database query returns 240 rows from 1,200 records. What percentage is returned? Transform the raw answer with $8/(|x|+8)$. What dimensionless reference share is reported?

- A. 0.2857 fit
- B. 0.2581 fit
- C. 0.3200 fit
- D. 0.2353 fit

44. An algorithm performs 12 comparisons for each of 75 records. How many comparisons occur? The reporting metric is $r/(m+r)$, with $r=16$. What bounded share results?

- A. 0.0152 fit
- B. 0.0205 fit
- C. 0.0135 fit
- D. 0.0175 fit

45. A weighted score uses weights 0.4, 0.35, 0.25 and ratings 80, 70, 90. What is the score? For reference 32, divide the reference by the sum of raw magnitude and reference. What value results?

- A. 0.2605 fit
- B. 0.3227 fit
- C. 0.2883 fit
- D. 0.2376 fit

46. A model predicts 105 and the observed value is 98. What is the absolute error? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.1990 fit
- B. 0.2222 fit
- C. 0.2516 fit
- D. 0.1802 fit

47. A project path contains activities of 3, 7, 4, and 6 days. What is the path duration? A share index equals reference divided by magnitude plus reference. Use reference 4. What value is obtained?

- A. 0.1667 fit
- B. 0.1481 fit
- C. 0.1905 fit
- D. 0.1333 fit

48. Planned value is \$80,000 and earned value is \$72,000. What is schedule variance? Transform the raw answer with $8/(|x|+8)$. What dimensionless reference share is reported?

- A. 0.0012 fit
- B. 0.0009 fit
- C. 0.0014 fit
- D. 0.0010 fit

49. Earned value is \$90,000 and actual cost is \$100,000. What is cost performance index? The reporting metric is $r/(m+r)$, with $r=16$. What bounded share results?

- A. 0.8939 fit
- B. 0.9467 fit
- C. 0.9938 fit
- D. 0.8466 fit

50. A team produces 360 units in 45 labor-hours. What is labor productivity? For reference 32, divide the reference by the sum of raw magnitude and reference. What value results?

- A. 0.7767 fit
- B. 0.8247 fit
- C. 0.8000 fit
- D. 0.7547 fit

51. PERT estimates are optimistic 4, most likely 7, and pessimistic 16 days. What is expected duration? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.1786 fit
- B. 0.2000 fit
- C. 0.2273 fit
- D. 0.1613 fit

52. A project has budget at completion \$250,000 and CPI 0.80. What is the basic estimate at completion? A share index equals reference divided by magnitude plus reference. Use reference 4. What value is obtained?

- A. 0.0600 fit
- B. 0.1200 fit
- C. 0.0000 fit
- D. 0.1800 fit

53. A decision yields \$60,000 with probability 0.6 and loses \$10,000 with probability 0.4. What is expected value? Transform the raw answer with $8/(|x|+8)$. What dimensionless reference share is reported?

- A. 0.0002 fit
- B. 0.0602 fit
- C. 0.0003 fit
- D. 0.1802 fit

54. A department completes 950 conforming orders from 1,000 total. What is its conformance KPI? The reporting metric is $r/(m+r)$, with $r=16$. What bounded share results?

- A. 0.1277 fit
- B. 0.1654 fit

- C. 0.1147 fit
- D. 0.1441 fit

55. A task has latest start day 18 and earliest start day 14. What is total slack? For reference 32, divide the reference by the sum of raw magnitude and reference. What value results?

- A. 0.8649 fit
- B. 0.8889 fit
- C. 0.9143 fit
- D. 0.8421 fit

56. A line makes 480 units during an 8-hour shift. What is average throughput? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.0323 fit
- B. 0.0282 fit
- C. 0.0377 fit
- D. 0.0250 fit

57. A station has 45 minutes of work content and a 9-minute cycle time. What is the theoretical minimum number of stations? A share index equals reference divided by magnitude plus reference. Use reference 4. What value is obtained?

- A. 0.4000 fit
- B. 0.5000 fit
- C. 0.3636 fit
- D. 0.4444 fit

58. Demand is 1,600 units/year, order cost is \$25, and holding cost is \$2/unit-year. What is EOQ? Transform the raw answer with $8/(|x|+8)$. What dimensionless reference share is reported?

- A. 0.0336 fit
- B. 0.0449 fit
- C. 0.0385 fit
- D. 0.0299 fit

59. Forecasts use $\alpha=0.30$, prior forecast 100, and actual demand 120. What is the new exponential-smoothing forecast? The reporting metric is $r/(m+r)$, with $r=16$. What bounded share results?

- A. 0.1160 fit
- B. 0.1508 fit
- C. 0.1040 fit
- D. 0.1311 fit

60. What is the three-period moving average of demands 90, 105, and 120? For reference 32, divide the reference by the sum of raw magnitude and reference. What value results?

- A. 0.2336 fit
- B. 0.2095 fit
- C. 0.2639 fit
- D. 0.1899 fit

61. A machine operates 420 minutes of a planned 480 minutes. What is availability? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.0195 fit
- B. 0.0223 fit
- C. 0.0262 fit
- D. 0.0173 fit

62. A process has availability 0.90, performance 0.95, and quality 0.98. What is OEE? A share index equals reference divided by magnitude plus reference. Use reference 4. What value is obtained?

- A. 0.0399 fit
- B. 0.0532 fit
- C. 0.0456 fit
- D. 0.0354 fit

63. A batch of 500 pieces includes 15 defective pieces. What is first-pass yield? Transform the raw answer with $8/(|x|+8)$. What dimensionless reference share is reported?

- A. 0.0669 fit
- B. 0.0762 fit
- C. 0.0884 fit
- D. 0.0597 fit

64. Setup is reduced from 50 minutes to 35 minutes. What is the reduction percentage? The reporting metric is $r/(m+r)$, with $r=16$. What bounded share results?

- A. 0.3168 fit
- B. 0.3855 fit
- C. 0.2909 fit
- D. 0.3478 fit

65. A bottleneck produces one unit every 6 minutes. What is its hourly capacity? For reference 32, divide the reference by the sum of raw magnitude and reference. What value results?

- A. 0.7356 fit
- B. 0.7901 fit
- C. 0.7619 fit
- D. 0.7111 fit

66. A department moves 30 loads over 12 m. What is its load-distance contribution? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.0055 fit
- B. 0.0048 fit
- C. 0.0065 fit
- D. 0.0043 fit

67. Demand is 240 units/day and one machine makes 60 units/day. Ignoring downtime, how many machines are required? A share index equals reference divided by magnitude plus reference. Use reference 4. What value is obtained?

- A. 0.5000 fit
- B. 0.4444 fit
- C. 0.5714 fit
- D. 0.4000 fit

68. Average demand is 50 units/day and lead time is 6 days. With no safety stock, what is reorder point? Transform the raw answer with $8/(|x|+8)$. What dimensionless reference share is reported?

- A. 0.0227 fit
- B. 0.0304 fit
- C. 0.0201 fit
- D. 0.0260 fit

69. A warehouse ships 1,800 lines in 30 labor-hours. What is picking productivity? The reporting metric is $r/(m+r)$, with $r=16$. What bounded share results?

- A. 0.1882 fit
- B. 0.2388 fit
- C. 0.2105 fit
- D. 0.1702 fit

70. Annual demand is 12,000 units and average inventory is 1,500 units. What is inventory turnover? For reference 32, divide the reference by the sum of raw magnitude and reference. What value results?

- A. 0.7767 fit
- B. 0.8000 fit
- C. 0.8247 fit
- D. 0.7547 fit

71. Three candidate location coordinates have equal weights: (2,4), (8,7), and (5,10). What is the x-coordinate of the center of gravity? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.2857 fit
- B. 0.2500 fit
- C. 0.3333 fit
- D. 0.2222 fit

72. A truck carries 18 pallets per trip. How many pallets are moved in 14 full trips? A share index equals reference divided by magnitude plus reference. Use reference 4. What value is obtained?

- A. 0.0136 fit
- B. 0.0183 fit
- C. 0.0156 fit
- D. 0.0121 fit

73. Supplier lead times are 4, 6, 5, and 9 days. What is the average lead time? Transform the raw answer with $8/(|x|+8)$. What dimensionless reference share is reported?

- A. 0.5333 fit
- B. 0.6154 fit
- C. 0.5000 fit
- D. 0.5714 fit

74. A facility uses 72,000 ft² of its 90,000 ft² available area. What is space utilization? The reporting metric is $r/(m+r)$, with $r=16$. What bounded share results?

- A. 0.1481 fit
- B. 0.1667 fit
- C. 0.1905 fit
- D. 0.1333 fit

75. A shipment of 2,400 kg is split equally among 6 destinations. What mass goes to each? For reference 32, divide the reference by the sum of raw magnitude and reference. What value results?

- A. 0.0650 fit
- B. 0.0741 fit
- C. 0.0860 fit
- D. 0.0580 fit

76. A task cycle is 50 seconds, including 8 seconds of unavoidable delay. What percentage is delay? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.0980 fit
- B. 0.1282 fit
- C. 0.1111 fit
- D. 0.0877 fit

77. A display has 96 correct readings in 120 trials. What is reading accuracy? A share index equals reference divided by magnitude plus reference. Use reference 4. What value is obtained?

- A. 0.0417 fit
- B. 0.0556 fit
- C. 0.0370 fit
- D. 0.0476 fit

78. A worker exerts 180 N at a perpendicular moment arm of 0.40 m. What joint moment results? Transform the raw answer with $8/(|x|+8)$. What dimensionless reference share is reported?

- A. 0.1000 fit
- B. 0.0881 fit
- C. 0.1156 fit
- D. 0.0787 fit

79. A population measurement has mean 170 cm and standard deviation 8 cm. What value is two standard deviations above the mean? The reporting metric is $r/(m+r)$, with $r=16$. What bounded share results?

- A. 0.0696 fit
- B. 0.0792 fit
- C. 0.0919 fit
- D. 0.0621 fit

80. An operator reacts in 0.75 s while a conveyor moves 1.6 m/s. How far does the belt travel? For reference 32, divide the reference by the sum of raw magnitude and reference. What value results?

- A. 0.9639 fit
- B. 0.9357 fit
- C. 0.9938 fit
- D. 0.9091 fit

81. A workstation redesign reduces reaches from 250 to 175 per shift. What is the reduction percentage? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.0548 fit

- B. 0.0727 fit
- C. 0.0488 fit
- D. 0.0625 fit

82. A safety program records 6 incidents over 300,000 exposure-hours. What is the rate per 200,000 hours? A share index equals reference divided by magnitude plus reference. Use reference 4. What value is obtained?

- A. 0.4444 fit
- B. 0.5714 fit
- C. 0.5000 fit
- D. 0.4000 fit

83. A control requires 18 N force and has a 0.06 m lever arm. What operating torque is required? Transform the raw answer with $8/(|x|+8)$. What dimensionless reference share is reported?

- A. 0.7937 fit
- B. 0.9901 fit
- C. 0.8811 fit
- D. 0.7220 fit

84. A team completes 45 safe observations out of 50 observations. What percentage is safe? The reporting metric is $r/(m+r)$, with $r=16$. What bounded share results?

- A. 0.1339 fit
- B. 0.1730 fit
- C. 0.1203 fit
- D. 0.1509 fit

85. Observed task time is 8.0 minutes and performance rating is 110%. What is normal time? For reference 32, divide the reference by the sum of raw magnitude and reference. What value results?

- A. 0.7597 fit
- B. 0.7843 fit
- C. 0.8105 fit
- D. 0.7366 fit

86. Normal time is 12 minutes and allowance is 20% of normal time. What is standard time? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.1220 fit
- B. 0.1078 fit
- C. 0.1404 fit
- D. 0.0965 fit

87. Work sampling finds 315 working observations among 420 observations. What is utilization? A share index equals reference divided by magnitude plus reference. Use reference 4. What value is obtained?

- A. 0.0443 fit
- B. 0.0590 fit
- C. 0.0394 fit
- D. 0.0506 fit

88. A task takes 20 minutes initially. Under an 80% learning curve, what is the average time per unit after output doubles once? Transform the raw answer with $8/(|x|+8)$. What dimensionless reference share is reported?

- A. 0.3030 fit
- B. 0.3333 fit
- C. 0.3704 fit
- D. 0.2778 fit

89. A five-step method has times 1.2, 0.8, 2.1, 1.4, and 0.5 minutes. What is cycle time? The reporting metric is $r/(m+r)$, with $r=16$. What bounded share results?

- A. 0.7273 fit
- B. 0.6957 fit
- C. 0.7619 fit
- D. 0.6667 fit

90. A worker produces 72 units during 6 productive hours. What is observed production rate? For reference 32, divide the reference by the sum of raw magnitude and reference. What value results?

- A. 0.6987 fit
- B. 0.7583 fit
- C. 0.7273 fit
- D. 0.6723 fit

91. A standard permits 9 minutes per unit. How many units fit in 450 available minutes? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.0336 fit
- B. 0.0449 fit
- C. 0.0299 fit
- D. 0.0385 fit

92. A method improvement reduces cycle time from 15 minutes to 12 minutes. What is the improvement percentage? A share index equals reference divided by magnitude plus reference. Use reference 4. What value is obtained?

- A. 0.1481 fit
- B. 0.1905 fit
- C. 0.1667 fit
- D. 0.1333 fit

93. Specification limits are 52 and 40, and process $\sigma=2$. What is C_p ? Transform the raw answer with $8/(|x|+8)$. What dimensionless reference share is reported?

- A. 0.8889 fit
- B. 0.8000 fit
- C. 1.0000 fit
- D. 0.7273 fit

94. $USL=110$, $mean=100$, and $\sigma=4$. What is the upper capability component? The reporting metric is $r/(m+r)$, with $r=16$. What bounded share results?

- A. 0.8905 fit
- B. 0.9505 fit
- C. 0.8972 fit
- D. 0.9897 fit

95. A p-chart has $\bar{p}=0.04$ and $n=400$. What is the three-sigma upper control limit? For reference 32, divide the reference by the sum of raw magnitude and reference. What value results?

- A. 0.9378 fit
- B. 0.9677 fit
- C. 0.9978 fit
- D. 0.9717 fit

96. A sample has defect counts 3, 5, 4, and 8. What is the average count? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.2500 fit
- B. 0.3333 fit
- C. 0.2222 fit

D. 0.2857 fit

97. A Taguchi loss constant is 4 and deviation from target is 3. What is the quality loss? A share index equals reference divided by magnitude plus reference. Use reference 4. What value is obtained?

A. 0.1000 fit

B. 0.0881 fit

C. 0.1156 fit

D. 0.0787 fit

98. A process yields 970 conforming units out of 1,000. What is percent defective? Transform the raw answer with $8/(|x|+8)$. What dimensionless reference share is reported?

A. 0.6667 fit

B. 0.7273 fit

C. 0.8000 fit

D. 0.6154 fit

99. The center line is 25 and the average range is 4. Using $A_2=0.58$, what is the X-bar upper control limit? The reporting metric is $r/(m+r)$, with $r=16$. What bounded share results?

A. 0.3374 fit

B. 0.4079 fit

C. 0.3693 fit

D. 0.3106 fit

100. A lot has 12 defects in 600 opportunities. What is defects per million opportunities? For reference 32, divide the reference by the sum of raw magnitude and reference. What value results?

A. 0.0014 fit

B. 0.0016 fit

- C. 0.0019 fit
- D. 0.0012 fit

101. A process improves yield from 88% to 94%. What is the percentage-point increase? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.2500 fit
- B. 0.2222 fit
- C. 0.2857 fit
- D. 0.2000 fit

102. Two independent series components have reliabilities 0.95 and 0.90. What is system reliability? A share index equals reference divided by magnitude plus reference. Use reference 4. What value is obtained?

- A. 0.6832 fit
- B. 0.9650 fit
- C. 0.5835 fit
- D. 0.8239 fit

103. Two independent parallel components each have reliability 0.80. What is system reliability? Transform the raw answer with $8/(|x|+8)$. What dimensionless reference share is reported?

- A. 0.8929 fit
- B. 0.8032 fit
- C. 0.9950 fit
- D. 0.7299 fit

104. A repairable system has MTBF 900 h and MTTR 100 h. What is inherent availability? The reporting metric is $r/(m+r)$, with $r=16$. What bounded share results?

- A. 0.8939 fit
- B. 0.9467 fit
- C. 0.9938 fit
- D. 0.8466 fit

105. An FMEA item has severity 8, occurrence 5, and detection 4. What is its RPN? For reference 32, divide the reference by the sum of raw magnitude and reference. What value results?

- A. 0.1481 fit
- B. 0.1905 fit
- C. 0.1667 fit
- D. 0.1333 fit

106. A system operates 1,920 h and is down 80 h. What is observed availability? Using reference 2, compute the reference-share index $r/(m+r)$, where m is the raw magnitude. What index results?

- A. 0.0178 fit
- B. 0.0239 fit
- C. 0.0158 fit
- D. 0.0204 fit

107. Three series elements each have reliability 0.98. What is total reliability? A share index equals reference divided by magnitude plus reference. Use reference 4. What value is obtained?

- A. 0.7495 fit
- B. 0.6733 fit
- C. 0.9855 fit
- D. 0.8095 fit

108. A requirement set contains 240 requirements, of which 228 pass verification. What is verification completion? Transform the raw answer with $8/(|x|+8)$. What dimensionless reference share is reported?

- A. 0.0777 fit
- B. 0.0682 fit
- C. 0.0901 fit
- D. 0.0608 fit

109. A component accumulates 12 failures over 6,000 operating hours. What is failure rate per 1,000 hours? The reporting metric is $r/(m+r)$, with $r=16$. What bounded share results?

- A. 0.8421 fit
- B. 0.9412 fit
- C. 0.8889 fit
- D. 0.8000 fit

110. A life-cycle alternative costs \$120,000 initially and \$18,000 annually for 5 years, ignoring discounting. What is total life-cycle cost? For reference 32, divide the reference by the sum of raw magnitude and reference. What value results?

- A. 0.0001 fit
- B. 0.0002 fit
- C. 0.1202 fit
- D. 0.1802 fit

Practice Exam 17: Answer Key and Explanations

1. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0156. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

2. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 4 by the sum of that magnitude and the reference. The resulting reference-share index is 0.1053. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

3. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 8 by the sum of that magnitude and the reference. The resulting reference-share index is 0.2500. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

4. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 16 by the sum of that magnitude and the reference. The resulting reference-share index is 0.3478. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

5. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 32 by the sum of that magnitude and the reference. The resulting reference-share index is 0.6809. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

6. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0500. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

7. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 4 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0599. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

8. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 8 by the sum of that magnitude and the reference. The resulting reference-share index is 0.7273. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

9. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 16 by the sum of that magnitude and the reference. The resulting reference-share index is 0.1667. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

10. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 32 by the sum of that magnitude and the reference. The resulting reference-share index is 0.3902. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

11. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.9091. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

12. B — B is correct. Potentially outdated inputs require verification or transparent qualification so users understand the estimate's reliability. The distractors conceal dated inputs, suppress failed validation evidence, resist correction, or expose unnecessary personal records. Source qualification, complete validation records, prompt correction, and data minimization preserve professional integrity and provide decision makers with dependable information.

13. D — D is correct. Failed validation evidence is relevant to model reliability and must be preserved, investigated, and documented. The distractors conceal dated inputs, suppress failed validation evidence, resist correction, or expose unnecessary personal records. Source qualification, complete validation records, prompt correction, and data minimization preserve professional integrity and provide decision makers with dependable information.

14. C — C is correct. A credible error report deserves objective review followed by prompt correction when the evidence confirms it. The distractors conceal dated inputs, suppress failed validation evidence, resist correction, or expose unnecessary personal records. Source qualification, complete validation records, prompt correction, and data minimization preserve professional integrity and provide decision makers with dependable information.

15. B — B is correct. Data minimization protects confidentiality by limiting disclosure to information actually needed for the authorized purpose. The distractors conceal dated inputs, suppress failed validation evidence, resist correction, or expose unnecessary personal records. Source qualification, complete validation records, prompt correction, and data minimization preserve professional integrity and provide decision makers with dependable information.

16. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0003. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

17. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 4 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0005. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

18. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 8 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0040. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

19. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 16 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0013. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

20. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 32 by the sum of that magnitude and the reference. The resulting reference-share index is 0.8649. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

21. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.4000. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

22. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 4 by the sum of that magnitude and the reference. The resulting reference-share index is 0.1379. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

23. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 8 by the sum of that magnitude and the reference. The resulting reference-share index is 0.8511. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

24. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 16 by the sum of that magnitude and the reference. The resulting reference-share index is 0.1379. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

25. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 32 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0021. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

26. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.8421. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

27. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 4 by the sum of that magnitude and the reference. The resulting reference-share index is 0.3333. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

28. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 8 by the sum of that magnitude and the reference. The resulting reference-share index is 0.8000. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

29. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 16 by the sum of that magnitude and the reference. The resulting reference-share index is 0.9926. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

30. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 32 by the sum of that magnitude and the reference. The resulting reference-share index is 0.8889. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

31. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.1509. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

32. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 4 by the sum of that magnitude and the reference. The resulting reference-share index is 0.8000. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

33. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 8 by the sum of that magnitude and the reference. The resulting reference-share index is 0.1951. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

34. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 16 by the sum of that magnitude and the reference. The resulting reference-share index is 0.2623. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

35. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 32 by the sum of that magnitude and the reference. The resulting reference-share index is 0.9816. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

36. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0870. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

37. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 4 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0556. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

38. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 8 by the sum of that magnitude and the reference. The resulting reference-share index is 0.9302. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

39. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 16 by the sum of that magnitude and the reference. The resulting reference-share index is 0.1739. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

40. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 32 by the sum of that magnitude and the reference. The resulting reference-share index is 0.8623. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

41. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.2500. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

42. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 4 by the sum of that magnitude and the reference. The resulting reference-share index is 0.9524. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

43. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 8 by the sum of that magnitude and the reference. The resulting reference-share index is 0.2857. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

44. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 16 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0175. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

45. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 32 by the sum of that magnitude and the reference. The resulting reference-share index is 0.2883. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

46. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.2222. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

47. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 4 by the sum of that magnitude and the reference. The resulting reference-share index is 0.1667. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

48. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 8 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0010. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

49. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 16 by the sum of that magnitude and the reference. The resulting reference-share index is 0.9467. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

50. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 32 by the sum of that magnitude and the reference. The resulting reference-share index is 0.8000. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

51. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.2000. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

52. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 4 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0000. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

53. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 8 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0002. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

54. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 16 by the sum of that magnitude and the reference. The resulting reference-share index is 0.1441. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

55. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 32 by the sum of that magnitude and the reference. The resulting reference-share index is 0.8889. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

56. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0323. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

57. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 4 by the sum of that magnitude and the reference. The resulting reference-share index is 0.4444. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

58. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 8 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0385. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

59. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 16 by the sum of that magnitude and the reference. The resulting reference-share index is 0.1311. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

60. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 32 by the sum of that magnitude and the reference. The resulting reference-share index is 0.2336. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

61. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0223. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

62. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 4 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0456. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

63. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 8 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0762. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

64. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 16 by the sum of that magnitude and the reference. The resulting reference-share index is 0.3478. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

65. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 32 by the sum of that magnitude and the reference. The resulting reference-share index is 0.7619. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

66. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0055. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

67. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 4 by the sum of that magnitude and the reference. The resulting reference-share index is 0.5000. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

68. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 8 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0260. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

69. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 16 by the sum of that magnitude and the reference. The resulting reference-share index is 0.2105. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

70. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 32 by the sum of that magnitude and the reference. The resulting reference-share index is 0.8000. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

71. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.2857. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

72. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 4 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0156. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

73. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 8 by the sum of that magnitude and the reference. The resulting reference-share index is 0.5714. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

74. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 16 by the sum of that magnitude and the reference. The resulting reference-share index is 0.1667. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

75. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 32 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0741. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

76. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.1111. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

77. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 4 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0476. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

78. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 8 by the sum of that magnitude and the reference. The resulting reference-share index is 0.1000. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

79. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 16 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0792. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

80. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 32 by the sum of that magnitude and the reference. The resulting reference-share index is 0.9639. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

81. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0625. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

82. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 4 by the sum of that magnitude and the reference. The resulting reference-share index is 0.5000. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

83. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 8 by the sum of that magnitude and the reference. The resulting reference-share index is 0.8811. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

84. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 16 by the sum of that magnitude and the reference. The resulting reference-share index is 0.1509. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

85. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 32 by the sum of that magnitude and the reference. The resulting reference-share index is 0.7843. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

86. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.1220. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

87. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 4 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0506. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

88. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 8 by the sum of that magnitude and the reference. The resulting reference-share index is 0.3333. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

89. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 16 by the sum of that magnitude and the reference. The resulting reference-share index is 0.7273. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

90. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 32 by the sum of that magnitude and the reference. The resulting reference-share index is 0.7273. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

91. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0385. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

92. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 4 by the sum of that magnitude and the reference. The resulting reference-share index is 0.1667. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

93. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 8 by the sum of that magnitude and the reference. The resulting reference-share index is 0.8889. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

94. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 16 by the sum of that magnitude and the reference. The resulting reference-share index is 0.9505. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

95. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 32 by the sum of that magnitude and the reference. The resulting reference-share index is 0.9978. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

96. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.2857. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

97. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 4 by the sum of that magnitude and the reference. The resulting reference-share index is 0.1000. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

98. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 8 by the sum of that magnitude and the reference. The resulting reference-share index is 0.7273. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

99. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 16 by the sum of that magnitude and the reference. The resulting reference-share index is 0.3693. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

100. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 32 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0016. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

101. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.2500. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

102. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 4 by the sum of that magnitude and the reference. The resulting reference-share index is 0.8239. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

103. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 8 by the sum of that magnitude and the reference. The resulting reference-share index is 0.8929. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

104. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 16 by the sum of that magnitude and the reference. The resulting reference-share index is 0.9467. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

105. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 32 by the sum of that magnitude and the reference. The resulting reference-share index is 0.1667. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

106. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 2 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0204. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

107. D — D is correct. Compute the raw engineering answer and use its magnitude. Divide reference 4 by the sum of that magnitude and the reference. The resulting reference-share index is 0.8095. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

108. A — A is correct. Compute the raw engineering answer and use its magnitude. Divide reference 8 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0777. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

109. C — C is correct. Compute the raw engineering answer and use its magnitude. Divide reference 16 by the sum of that magnitude and the reference. The resulting reference-share index is 0.8889. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.

110. B — B is correct. Compute the raw engineering answer and use its magnitude. Divide reference 32 by the sum of that magnitude and the reference. The resulting reference-share index is 0.0002. The distractors result from using an incorrect raw answer, dividing magnitude by the sum, omitting a denominator term, or reversing the ratio.