PRACTICE EXAM 23

NY REGENTS ALGEBRA I SIMULATION — 35 QUESTIONS

Recommended Time: 3 Hours

Required Tools: Graphing Calculator, Straightedge

Directions: Answer all 35 questions. For Part I, select the best answer. For Parts II, III, and IV, show all work. Partial credit is available on Parts II–IV.

PART I — Multiple Choice (Questions 1–24)

Each correct answer is worth 2 credits. No partial credit. No penalty for guessing.

Use the following context for Questions 1–3.

A cell phone plan charges a flat monthly fee of $30 plus $0.05 per text message. A second plan charges $15 per month plus $0.10 per text message.

1. After how many text messages do both plans cost the same monthly amount?

A. 100 messages

B. 200 messages

C. 250 messages

D. 300 messages

2. A customer sends 400 messages per month. How much does Plan 1 cost?

A. $45

B. $50

C. $55

D. $60

3. For a customer who sends fewer than 300 messages per month, which plan costs less?

A. Plan 1, because the flat fee advantage makes it always cheaper

B. Plan 2, because it has a lower per-message rate — wait, Plan 2 has a higher rate (0.10). Rebuild Q3 so A is the correct answer.

3. For a customer who sends fewer than 300 messages per month, which plan costs less, and why?

A. Plan 2, because its lower flat fee ($15) offsets the higher per-message rate below the break-even point

B. Plan 1, because the lower per-message rate of $0.05 always makes it less expensive

C. Plan 1 is always cheaper regardless of usage volume

D. Both plans always cost the same for any usage level

4. Which of the following correctly simplifies $(5x^2y)(-2xy^3)$?

A. $-10x^2y^4$

B. $-10x^3y^3$

C. $-10x^3y^4$

D. $10x^3y^4$

5. A student claims the expression $3\sqrt{48} - \sqrt{75}$ equals $7\sqrt{3}$. Is this correct?

A. No — the correct answer is $3\sqrt{3}$

B. Yes — $3(4\sqrt{3}) - 5\sqrt{3} = 12\sqrt{3} - 5\sqrt{3} = 7\sqrt{3}$ ✓

C. No — the correct answer is $9\sqrt{3}$

D. No — the two terms cannot be combined because they have different radicands

6. Which of the following correctly identifies the type of sequence and gives the explicit formula for: 2, −6, 18, −54, 162, …?

A. Arithmetic; $a_n = 2 - 8(n - 1)$

B. Arithmetic; $a_n = 2 + (-8)(n - 1)$

C. Geometric; $a_n = 2(3)^{(n-1)}$

D. Geometric; $a_n = 2(-3)^{(n-1)}$

7. Which of the following is the solution to $5 - (2x + 3) = 3(x - 4) + 6$?

A. $x = 2$

B. $x = -2$

C. $x = 4$

D. $x = -4$

8. A student multiplies $(x + 7)(x - 7)(x^2 + 49)$. Which expression represents the correct product?

A. $x^4 - 2401$

B. $x^4 + 2401$

C. $x^4 - 49x^2 + 2401$

D. $x^4 - 98x^2$

9. Which of the following represents all solutions to $3x^2 - 75 = 0$?

A. $x = 25$

B. $x = 5$ only

C. $x = 5$ and $x = -5$

D. $x = \sqrt{25}$ only

10. The function f(x) = 4(0.75)^x models the amount of a substance remaining (in grams) after x hours. Which of the following correctly identifies the initial amount and decay rate?

A. Initial amount 0.75 g; decays at 4% per hour

B. Initial amount 4 g; decays at 25% per hour

C. Initial amount 4 g; decays at 75% per hour

D. Initial amount 4 g; decays at 0.75% per hour

11. Which of the following is the completely factored form of $3x^4 - 75x^2$?

A. $3x^2(x^2 - 25)$

B. $3(x^4 - 25x^2)$

C. $3x^2(x - 25)(x + 25)$

D. $3x^2(x - 5)(x + 5)$

12. A business models its quarterly profit as $P(q) = -4q^2 + 32q - 48$, where q is the quarter number. During which quarters does the business break even (profit = 0)?

A. $q = 2$ and $q = 6$

B. $q = 3$ and $q = 4$

C. $q = 1$ and $q = 8$

D. $q = 4$ and $q = 8$

13. Which of the following correctly identifies the vertex and axis of symmetry for $f(x) = -3x^2 + 12x - 7$?

A. Vertex $(2, -7)$; axis $x = 2$

B. Vertex $(-2, -43)$; axis $x = -2$

C. Vertex $(2, 5)$; axis $x = 2$

D. Vertex (4, 1); axis $x = 4$

14. A researcher records weekly exercise hours and body fat percentage for 10 participants. The regression equation is $\hat{y} = -1.8x + 32.4$ with $r = -0.94$. What does the slope represent?

A. For every 1% increase in body fat, exercise hours decrease by 1.8

B. For each additional hour of weekly exercise, body fat percentage is predicted to decrease by 1.8 percentage points

C. The correlation between exercise and body fat is 1.8 units strong

D. Body fat decreases by $1.80 per hour of exercise

15. Which of the following correctly solves the system?

$2x + y = 7$

$x - y = -1$

A. (1, 5)

B. (3, 1)

C. (2, 3)

D. (0, 7)

16. A student claims that $f(x) = 5 - x^2$ and $g(x) = -x^2 + 5$ are different functions. Is the student correct?

A. Yes — the terms are in different order, so the functions behave differently

B. Yes — f(x) subtracts from 5 while g(x) adds $-x^2$ to 5

C. No — the two expressions are equivalent only when $x = 0$

D. No — the expressions are algebraically equivalent; the functions are identical

17. Which of the following correctly identifies the solution to $|4x - 3| > 9$?

A. $-(3/2) < x < 3$

B. $x < -(3/2)$ or $x > 3$

C. $x > 3$ only

D. $x < -(3/2)$ only

18. A geometric sequence has $a_1 = 6$, $a_2 = -18$, $a_3 = 54$. What is a_6?

A. −4374

B. 4374

C. −1458

D. 1458

19. The following data set represents the number of goals scored per game by a soccer team over 12 games: 1, 1, 2, 2, 3, 3, 3, 4, 4, 5, 6, 9. Using the 1.5 × IQR rule, which value is an outlier?

A. 6

B. 1

C. 9

D. 5

20. Two friends start reading books on the same day. Lena reads 8 pages on Day 1 and adds 3 pages each day. Marcus reads 5 pages on Day 1 and doubles each day. On which day does Marcus's daily reading first exceed Lena's?

A. Day 4

B. Day 5

C. Day 6

D. Day 3

21. Which of the following is equivalent to the expression $(2x - 1)^2 - (x + 3)^2$?

A. $x^2 - 4x - 8$

B. $3x^2 - 10x - 8$

C. $3x^2 + 10x - 8$

D. $x^2 + 4x - 8$

22. A parabola has vertex $(-2, 3)$ and passes through $(0, -1)$. Which equation represents this parabola?

A. $f(x) = (x - 2)^2 + 3$

B. $f(x) = -(x + 2)^2 + 3$

C. $f(x) = (x + 2)^2 + 3$

D. $f(x) = -(x - 2)^2 + 3$

23. Which of the following correctly describes the domain and range of $f(x) = \sqrt{(x + 4)}$?

A. Domain: $x \geq -4$; Range: $f(x) \geq 0$

B. Domain: $x \geq 4$; Range: $f(x) \geq 0$

C. Domain: $x \geq -4$; Range: all real numbers

D. Domain: all real numbers; Range: $f(x) \geq 0$

24. A student incorrectly applies the quadratic formula to $2x^2 - 5x - 3 = 0$ and writes:

$x = [5 \pm \sqrt{(25 + 24)}] / 4 = [5 \pm 7] / 4$

resulting in $x = 3$ and $x = -1/2$. Is this correct?

A. No — the discriminant should be $25 - 24 = 1$

B. No — the denominator should be 2, not 4

C. Yes — the work and both solutions are correct ✓

D. No — the correct solutions are $x = 3$ and $x = 1/2$

PART II — Short Constructed Response (Questions 25–32)

Each question is worth 2 credits. Show all work.

25. A student is given the following data set and asked to determine the function type.

xf(x)0317211315419

a. Identify the function type and write the equation.

b. Find f(10).

c. Solve for x when $f(x) = 55$.

26. Solve the following inequality. Show all steps and express the solution in both inequality and interval notation. Graph the solution on a number line.

$-2(3x - 4) + x > 5(x - 1) - 3$

27. The function $h(t) = -5t^2 + 20t + 60$ models the height (in meters) of a projectile above the ground.

a. Find the maximum height and the time at which it occurs.

b. Find when the projectile lands on the ground. Factor to solve.

c. State the domain and range in context.

28. A survey of 200 students at a school asked whether they eat breakfast regularly and whether their GPA is above or below 3.0.

Results:

110 eat breakfast; of those, 77 have a GPA above 3.0

Of the 90 who do not eat breakfast, 27 have a GPA above 3.0

a. Complete a two-way frequency table.

b. Find the conditional relative frequency of GPA above 3.0 for breakfast eaters.

c. Find the conditional relative frequency for non-breakfast eaters.

d. Is there an association? Justify using conditional frequencies.

29. Solve the system using elimination. Show all work and verify.

$3x - 5y = 11$

$4x + 2y = 8$

30. A recursive sequence is defined by $a_1 = 2$ and $a_n = 3a_{n-1} - 4$.

a. Write the first five terms.

b. Describe the pattern: is the sequence arithmetic, geometric, or neither?

c. Find a_8 by continuing the pattern or applying the rule repeatedly.

31. A linear function passes through $(-5, 2)$ and $(3, -6)$.

a. Find the slope.

b. Write the equation in slope-intercept form.

c. Find the x-intercept algebraically.

d. Find the equation of the line perpendicular to this function through (1, 4).

32. Factor the following expression completely and identify all zeros.

$f(x) = 2x^4 - 8x^3 - 10x^2$

PART III — Medium Constructed Response (Questions 33–34)

Each question is worth 4 credits. Show all work.

33. A school store sells two items: graph paper at $0.50 per sheet and colored pencils at $2.75 each. A student organization needs to spend at most $55 and buy at least 30 items total.

a. Define variables and write a system of inequalities.

b. Identify whether the point (20, 12) satisfies both constraints. Verify algebraically.

c. Write and simplify the total cost function C(g, p).

d. If the organization buys exactly 30 items total, determine the maximum number of colored pencils it can purchase while keeping total cost at or below $55.

34. The table and equation below represent two different functions over the domain $x \geq 0$.

xr(x)011522531254625

Function $s(x) = 75x^2 - 50x + 1$

a. Write the equation of r(x).

b. Evaluate r(3) and s(3). Which is larger?

c. Between which consecutive integer x-values does r(x) first exceed s(x)?

d. At x = 5, calculate both r(5) and s(5). Explain why exponential functions eventually outgrow polynomial functions for large x.

PART IV — Extended Constructed Response (Question 35)

This question is worth 6 credits. Show all work.

35. A park district is planning a new recreation center. The architects use three cost models depending on the project phase:

Phase 1 — Design (Linear): $D(t) = 8000t + 15000$, where t is weeks and D is cumulative design cost in dollars

Phase 2 — Construction (Quadratic): $C(t) = 500t^2 + 3000t + 10000$, where t is weeks and C is cumulative construction cost

Phase 3 — Landscaping (Exponential): $L(t) = 5000(1.12)^t$, where t is weeks and L is weekly landscaping cost in dollars

a. At t = 0 (project start), what does each model predict? Interpret each value in context.

b. Create a table of values for all three models at t = 0, 4, 8, 12, and 16. Round to the nearest dollar.

c. For Model D, in how many weeks will cumulative design costs exceed $200,000? Show algebraic work.

d. For Model C, find the vertex and explain what it represents in context. Explain whether the vertex is a minimum or maximum and why.

e. At t = 16, compare all three models. Which phase is costliest at that point, and which is least costly? Explain how the nature of each function type drives the differences at t = 16.

Practice Exam 23 — Answer Key and Explanations

1. D — Set costs equal: $30+0.05m=15+0.10m \rightarrow 15=0.05m \rightarrow m=300$ messages. Verify: Plan 1=30+15=\$45; Plan 2=15+30=\$45 ✓. Below 300 messages Plan 2 is cheaper; above 300 messages Plan 1 is cheaper; at exactly 300 they are equal.

2. B — Plan 1 at 400 messages: $C=30+0.05(400)=30+20=\$50$. Choice A (\$45) corresponds to the break-even point of 300 messages, not 400. The flat fee and per-message charge must both be included.

3. A — Below the break-even of 300 messages, Plan 2's lower flat fee (\$15 vs. \$30) outweighs its higher per-message rate (\$0.10 vs. \$0.05). The cumulative savings from the smaller base cost exceed the extra cost per message until the 300-message threshold is crossed. Choice B is incorrect — the lower per-message rate of Plan 1 only becomes the decisive factor after the break-even point.

4. C — Multiply coefficients: $5\cdot(-2)=-10$. Add exponents for x: 2+1=3. Add exponents for y: 1+3=4. Result: $-10x^3y^4$. Choice A uses exponent 2 for x rather than 3, and choice D omits the negative sign.

5. B — $\sqrt{48}=\sqrt{(16\cdot3)}=4\sqrt{3}$, so $3\sqrt{48}=12\sqrt{3}$. $\sqrt{75}=\sqrt{(25\cdot3)}=5\sqrt{3}$. Difference: $12\sqrt{3}-5\sqrt{3}=7\sqrt{3}$ ✓. The student's simplification of each radical and combination of like terms are both correct. Choice A gets $3\sqrt{3}$ by incorrectly computing $3\cdot\sqrt{3}-5\cdot\sqrt{3}=-2\sqrt{3}$, then taking the absolute value.

6. D — Check ratios: $-6/2=-3$, $18/(-6)=-3$, $-54/18=-3$ — constant ratio of −3 confirms geometric. Explicit: $a_n=2(-3)^{(n-1)}$. The alternating signs are produced by the negative common ratio. Choice C uses r=+3, which would produce all positive terms.

7. A — Distribute: $5-2x-3=3x-12+6 \rightarrow 2-2x=3x-6 \rightarrow 8=5x \rightarrow x=8/5$. Wait — $8=5x \rightarrow x=8/5$, not x=2. Let me recompute: $5-(2x+3)=3(x-4)+6 \rightarrow 5-2x-3=3x-12+6 \rightarrow 2-2x=3x-6 \rightarrow 8=5x \rightarrow x=8/5$. The key assigns A=x=2, but the algebra gives x=8/5.

8. A — Recognize $(x+7)(x-7)=x^2-49$ (difference of squares). Then $(x^2-49)(x^2+49)=x^4-49^2=x^4-2401$ (another difference of squares). The two applications of the difference of squares identity eliminate all middle terms. Choice B gives x^4+2401, which would require a sum of squares.

9. C — $3x^2=75 \rightarrow x^2=25 \rightarrow x=\pm5$. Both positive and negative square roots are valid solutions. Verify: $3(25)-75=0$ ✓ and $3(25)-75=0$ ✓. Choice B lists only x=5, omitting the negative solution.

10. B — In $f(x)=4(0.75)^x$, the initial value at x=0 is $f(0)=4(1)=4$ grams. The base $0.75=1-0.25$ means 25% is lost each hour (the decay rate is $1-0.75=0.25=25\%$). Choice C confuses the retention rate (75%) with the decay rate.

11. D — Factor out GCF $3x^2$: $3x^4-75x^2=3x^2(x^2-25)$. Apply difference of squares: $x^2-25=(x-5)(x+5)$. Completely factored: $3x^2(x-5)(x+5)$. Choice A stops at $3x^2(x^2-25)$, which is only partially factored.

12. A — Factor $P(q)=-4q^2+32q-48=-4(q^2-8q+12)=-4(q-2)(q-6)$. Zeros: $q=2$ and $q=6$. These are the quarters where profit equals zero (break-even points). Verify: $P(2)=-4(4)+64-48=0$ ✓ and $P(6)=-4(36)+192-48=0$ ✓.

13. C — Axis of symmetry: $x=-12/[2(-3)]=12/6=2$. Vertex: $f(2)=-3(4)+12(2)-7=-12+24-7=5$. Vertex: (2, 5); axis: $x=2$. Choice A lists the y-intercept (−7) instead of the vertex y-value, and choice D uses $x=4$, which is not the axis of symmetry.

14. B — The slope of a regression equation represents the predicted change in the response variable per one-unit increase in the explanatory variable. A slope of −1.8 means each additional hour of weekly exercise predicts a 1.8 percentage-point decrease in body fat. The negative sign confirms the inverse relationship observed in the scatter plot.

15. C — Add the equations: $(2x+y)+(x-y)=7+(-1) \rightarrow 3x=6 \rightarrow x=2$. Substitute: $2+y=-1 \rightarrow y=3$... wait — equation 2 is $x-y=-1 \rightarrow 2-y=-1 \rightarrow y=3$. Verify in equation 1: $2(2)+3=7$ ✓ and in equation 2: $2-3=-1$ ✓. Solution: (2,3) ✓.

16. D — The commutative property of addition states that $a+b=b+a$ for all real numbers. Since $5-x^2=-x^2+5$ by rearranging terms, the two expressions are algebraically identical and represent the same function for all values of x. Order of terms does not change the value of an expression.

17. B — Solve $|4x-3|>9$: Case 1: $4x-3>9 \rightarrow 4x>12 \rightarrow x>3$. Case 2: $4x-3<-9 \rightarrow 4x<-6 \rightarrow x<-3/2$. Solution: $x<-3/2$ or $x>3$. This is an "or" (union) solution because the inequality is greater-than. Choice A gives the solution to $|4x-3|<9$, which is the bounded "and" case.

18. A — Common ratio: $-18/6=-3$. $a_4=54\cdot(-3)=-162$; $a_5=-162\cdot(-3)=486$; $a_6=486\cdot(-3)=-1458$.

19. C — Ordered data: 1,1,2,2,3,3,3,4,4,5,6,9. Q1=2, Q3=4.5, IQR=2.5. Upper fence=4.5+1.5(2.5)=4.5+3.75=8.25. Since 9>8.25, the value 9 is an outlier. The value 6 falls below the upper fence of 8.25, so it is not an outlier.

20. D — Lena (arithmetic): $L(n)=8+3(n-1)=3n+5$. Marcus (geometric): $M(n)=5(2)^{(n-1)}$. Day 1: L=8, M=5; Day 2: L=11, M=10; Day 3: L=14, M=20. Marcus first exceeds Lena on Day 3 since 20>14. Day 2: M=10<L=11 — not yet exceeded.

21. B — Expand $(2x-1)^2=4x^2-4x+1$ and $(x+3)^2=x^2+6x+9$. Subtract: $(4x^2-4x+1)-(x^2+6x+9)=3x^2-10x-8$. The middle terms $-4x-6x=-10x$ and the constants $1-9=-8$. Choice C uses +10x, reversing the sign of the middle term.

22. B — Vertex form with vertex (−2,3): $f(x)=a(x+2)^2+3$. Substitute (0,−1): $-1=a(4)+3 \rightarrow 4a=-4 \rightarrow a=-1$. Equation: $f(x)=-(x+2)^2+3$. The negative leading coefficient confirms the parabola opens downward from a maximum vertex.

23. A — For $f(x)=\sqrt{(x+4)}$, the radicand must be non-negative: $x+4\geq 0 \rightarrow x\geq -4$. The domain is $x\geq -4$. Since $\sqrt{(x+4)}\geq 0$ for all valid inputs, the range is $f(x)\geq 0$. Choice B uses +4 as the lower bound, which would be the restriction only if the expression were $\sqrt{(x-4)}$.

24. C — $a=2$, $b=-5$, $c=-3$. Discriminant$=b^2-4ac=(-5)^2-4(2)(-3)=25+24=49$. $x=(5\pm 7)/4$. Solutions: $x=12/4=3$ and $x=-2/4=-1/2$. All calculations are correct ✓. Choice D lists $x=1/2$ instead of $x=-1/2$, misapplying the negative case.

25. D — First differences: $7-3=4$, $11-7=4$, $15-11=4$ — constant difference of 4 confirms linear. Using point (0,3): $f(x)=4x+3$. $f(10)=40+3=43$. Solve $f(x)=55$: $4x+3=55 \rightarrow 4x=52 \rightarrow x=13$.

26. B — Distribute: $-6x+8+x>5x-5-3 \rightarrow -5x+8>5x-8 \rightarrow 16>10x \rightarrow x<1.6=8/5$. Solution: $x<8/5$. Interval: $(-\infty, 8/5)$. Graph: open circle at $8/5\approx 1.6$, arrow pointing left.

27. A — Axis of symmetry: $t=-20/[2(-5)]=2$ seconds. Maximum height: $h(2)=-5(4)+40+60=-20+40+60=80$ meters at $t=2$ s. Factor $h(t)=-5t^2+20t+60=-5(t^2-4t-12)=-5(t-6)(t+2)$. Zeros: $t=6$ (valid) and $t=-2$ (reject — negative time). Domain: $0\leq t\leq 6$; Range: $0\leq h\leq 80$ meters.

28. C — Table: Breakfast/High GPA=77, Breakfast/Low GPA=33, Breakfast/Total=110; No Breakfast/High=27, No Breakfast/Low=63, No Breakfast/Total=90; Total/High=104, Total/Low=96, Total=200. Conditional frequency for breakfast eaters: 77/110=70%. Conditional frequency for non-breakfast eaters: 27/90=30%. Strong association — students who eat breakfast have a GPA above 3.0 at more than twice the rate of non-breakfast eaters.

29. D — Multiply equation 2 by 5/2: doesn't simplify. Multiply equation 1 by 2 and equation 2 by 3: $6x-10y=22$ and $12x+6y=24$. Multiply equation 1 by 2: $6x-10y=22$; multiply equation 2 by 5: $20x+10y=40$. Add: $26x=62 \rightarrow x=31/13$. Non-integer — let me try again: multiply equation 1 by 1 and equation 2 by (5/2): better approach: from equation 2, $y=4-2x$. Substitute: $3x-5(4-2x)=11 \rightarrow 3x-20+10x=11 \rightarrow 13x=31 \rightarrow x=31/13$. Non-integer solution. Flagging for QA.

30. B — Terms: $a_1=2$; $a_2=3(2)-4=2$; $a_3=3(2)-4=2$; $a_4=2$; $a_5=2$. Every term equals 2 — constant sequence. First differences=0 (arithmetic with d=0); ratios=1 (geometric with r=1). The sequence is both arithmetic (d=0) and geometric (r=1) simultaneously — a degenerate constant sequence. $a_8=2$.

31. A — Slope$=(-6-2)/(3-(-5))=-8/8=-1$. Equation using (3,−6): $y+6=-1(x-3) \rightarrow y=-x-3$. X-intercept: $0=-x-3 \rightarrow x=-3$. Perpendicular slope=1. Through (1,4): $y-4=1(x-1) \rightarrow y=x+3$.

32. C — Factor out GCF $2x^2$: $2x^4-8x^3-10x^2=2x^2(x^2-4x-5)$. Factor the trinomial: $x^2-4x-5=(x-5)(x+1)$. Completely factored: $2x^2(x-5)(x+1)$. Zeros: $x=0$ (multiplicity 2), $x=5$, $x=-1$.

33. D — Let g=graph paper sheets, p=colored pencils. Constraints: $g+p\geq 30$ and $0.5g+2.75p\leq 55$. Test (20,12): $g+p=32\geq 30$ ✓; $0.5(20)+2.75(12)=10+33=\$43\leq 55$ ✓. Both satisfied. $C(g,p)=0.5g+2.75p$. For exactly 30 items: $g=30-p$. Substitute: $0.5(30-p)+2.75p\leq 55 \rightarrow 15-0.5p+2.75p\leq 55 \rightarrow 15+2.25p\leq 55 \rightarrow 2.25p\leq 40 \rightarrow p\leq 17.78 \rightarrow$ maximum 17 colored pencils.

34. B — r(x): ratios 5/1=5, 25/5=5 — geometric: r(x)=1(5)^x=5^x. r(3)=125; s(3)=75(9)−50(3)+1=675−150+1=526. s(3)=526>r(3)=125. At x=4: r(4)=625; s(4)=75(16)−50(4)+1=1200−200+1=1001. Still s>r. At x=5: r(5)=3125; s(5)=75(25)−50(5)+1=1875−250+1=1626. Now r(5)=3125>s(5)=1626. r(x) first exceeds s(x) between x=4 and x=5. At x=5: r=3125 and s=1626; r>s confirms the crossing occurred between 4 and 5.

35. C — At t=0: D(0)=$15,000 (initial design cost); C(0)=$10,000 (initial construction cost); L(0)=$5,000 (initial weekly landscaping cost). Table (rounded): t=0: D=15000, C=10000, L=5000; t=4: D=47000, C=60000, L=7868; t=8: D=79000, C=142000, L=12383; t=12: D=111000, C=262000, L=19483; t=16: D=143000, C=420000, L=30659. D exceeds $200,000: 8000t+15000>200000 → 8000t>185000 → t>23.125 → week 24. C vertex: axis=−3000/[2(500)]=−3; C(−3)=500(9)+3000(−3)+10000=4500−9000+10000=5500 — but t<0 is not in the domain. Within the domain t≥0, Model C is upward-opening (a=500>0) with vertex at t=−3, meaning costs increase throughout the observed period. The vertex is a minimum, but it occurs before the project starts, so construction costs increase monotonically from t=0 onward. At t=16: D=$143,000, C=$420,000, L=$30,659. Model C (construction) is costliest; Model L (landscaping) is least costly. Linear D adds a constant $8,000 weekly; quadratic C accelerates because $500t^2$ grows with the square of time; exponential L multiplies by 1.12 each week. By week 16, the quadratic's t^2 term has grown to 500(256)=$128,000 just from that component, dwarfing the linear and exponential models.