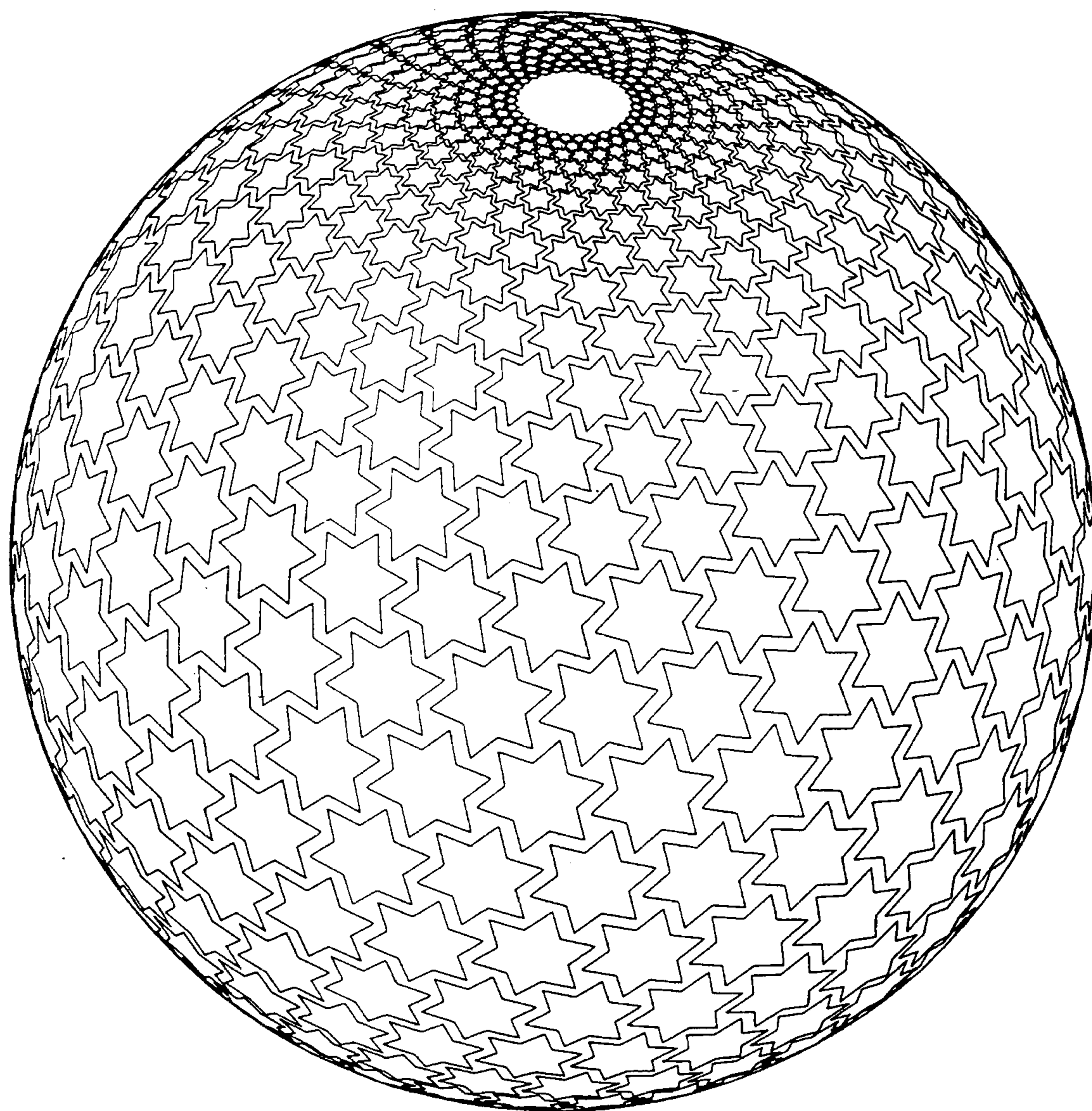


Pre-Calculus Algebra

MTH 111

Practice Final



Instructions:

Work the following problems. The best answer will be in simplest form and will have no negative exponents.

____ (1) Factor as completely as possible.

$$6X^4 - 3X^3M - 3X^2M^2$$

(A) $(3X^2 - XM)(2X^2 + 3XM)$ (B) $3(2X^2 - XM)(X^2 + XM)$

(C) $3X^2(2X + M)(X - M)$ (D) $3X^2(2X - M)(X + M)$

____ (2) Factor as completely as possible.

$$a^4b + 2a^3b^2 - 15a^2b^3$$

(A) $(a^2b - 5ab)(a^2b + 6ab^2)$ (B) $a^2b(a - 3b)(a + 5b)$

(C) $ab(a^2 + 2a^2b - 6b)$ (D) $a^2b(a + 3b)(a - 5b)$

____ (3) Factor as completely as possible.

$$125Y^3 - 1331$$

(A) $(5Y^2 - 121)(25Y + 121)$ (B) $5Y(25Y^2) - 11(121)$

(C) $(5Y - 11)(25Y^2 + 55Y - 121)$ (D) $(5Y - 11)(25Y^2 + 55Y + 121)$

____ (4) Perform the indicated operations.

$$\frac{3X^2 - 12}{3X^2 + 12} \cdot \frac{X^2 + 4}{(X - 2)(X + 2)}$$

(A) 1

(B) 3

(C) $\frac{X^2+4}{X^2-4}$

(D) $\frac{(X-2)(X-2)}{(X+2)(X+2)}$

____ (5) Solve the equation for X .

$$4(X - 5) - K = 3X - T$$

(A) $X = K - T + 5$

(B) $X = K - T + 20$

(C) $X = 4K - T - 5$

(D) $X = \frac{3}{4}K - \frac{3}{4}T + 15$

____ (6) Perform the indicated operations and simplify.

$$\frac{3}{X - 1} - \frac{2}{X} + \frac{X + 3}{X^2 - 1}$$

(A) $\frac{X+4}{X^2-2}$

(B) $\frac{X+4}{X(X-1)(X+1)}$

(C) $\frac{2(X^2+3X+1)}{X(X-1)(X+1)}$

(D) $\frac{2(X^2+1)}{X(X-1)(X-1)}$

_____ (7) Simplify the following compound fraction.

$$\frac{\frac{1}{X^2} - \frac{1}{Y^2}}{\frac{1}{X} - \frac{1}{Y}}$$

(A) $\frac{Y+X}{XY}$

(B) $X - Y$

(C) $\frac{X-Y}{XY}$

(D) $\frac{(X-Y)^2}{(X-Y)}$

_____ (8) Perform the indicated operations. Write answer with positive exponents.

$$(2M)^{\frac{1}{2}} 2M^{\frac{1}{4}}$$

(A) $(2M)^{\frac{1}{8}}$

(B) $2^{\frac{3}{2}} M^{\frac{1}{6}}$

(C) $2^{\frac{3}{4}} M^{\frac{3}{4}}$

(D) $2^{\frac{3}{2}} M^{\frac{3}{4}}$

_____ (9) Perform the indicated operations. Write answer with positive exponents.

$$\left(7^{-\frac{2}{3}}\right)^3$$

(A) $\frac{1}{49}$

(B) -49

(C) $7^{\frac{7}{3}}$

(D) $-\frac{1}{14}$

____ (10) Simplify the expression.

$$\left(\frac{625}{6561}\right)^{-\frac{3}{4}}$$

(A) $\frac{125}{729}$

(B) $\frac{468.75}{4920.75}$

(C) $-\frac{729}{125}$

(D) $\frac{729}{125}$

____ (11) Simplify.

$$\sqrt{96ab^2c^{15}}$$

(A) $48abc^7\sqrt{c}$

(B) $4abc^7\sqrt{6c}$

(C) $4bc^7\sqrt{6ac}$

(D) $4abc\sqrt{6c^7}$

____ (12) Simplify.

$$\sqrt{320K} - \sqrt{405K} + \sqrt{500K}$$

(A) 9

(B) $9\sqrt{5K}$

(C) $207.5\sqrt{K}$

(D) $83\sqrt{5K}$

____ (13) Rationalize the denominator.

$$\frac{2}{1 - \sqrt{3}}$$

(A) $-1 - \sqrt{3}$

(B) $1 + \sqrt{3}$

(C) -1

(D) $1 - \sqrt{3}$

____ (14) Solve the equation.

$$10 - \frac{2}{5X} = \frac{2}{3}$$

(A) $\{-134\}$

(B) $\{\frac{3}{70}\}$

(C) $\{\frac{7}{10}\}$

(D) $\{-\frac{1}{10}\}$

____ (15) Two jet airplanes leave from the same point at the same time. One of the planes is traveling at the rate of 250 miles per hour. The other plane is traveling at the rate of 300 miles per hour. If the planes are traveling in opposite directions, in how many hours will the planes be 3025 miles apart?

(A) $\frac{11}{2}$ or $5\frac{1}{2}$ hours

(B) $\frac{121}{2}$ or $60\frac{1}{2}$ hours

(C) 10 hours

(D) $6\frac{5}{100}$ hours

- (16) Beatrice won \$25,000 on "Wheel of Fortune." She would have won more, but she bought too many vowels. Beatrice put some of her winnings in Sajak Bank at an 8% interest rate. She put the remainder of her winnings in Vanna Bank at a 10% rate of interest. Beatrice's money earned \$2260 in simple interest for the year. How much money did Beatrice have invested in Sajak bank at 8%?

- (A) \$12,500 (B) \$13,000
(C) \$3,125 (D) \$12,000
-

- (17) Solve the equation.

$$X^2 + 3X - 54 = 0$$

- (A) $\{-6, 9\}$ (B) $\{-2, 27\}$
(C) $\{-3, 18\}$ (D) $\{-9, 6\}$
-

- (18) Solve the equation.

$$50X^2 - 60X - 7 = 0$$

- (A) $\left\{\frac{3 \pm 5\sqrt{2}}{5}\right\}$ (B) $\left\{\frac{-6 \pm 5\sqrt{2}}{10}\right\}$
(C) $\left\{\frac{6 \pm 5\sqrt{2}}{10}\right\}$ (D) $\left\{-60 \pm \frac{\sqrt{2}}{2}\right\}$

---- (19) Solve the equation.

$$M^2 + M + 1 = 0$$

(A) $\left\{\frac{1 \pm i\sqrt{3}}{2}\right\}$

(B) $\left\{-1 \pm \frac{i\sqrt{3}}{2}\right\}$

(C) $\left\{\frac{-1 \pm i\sqrt{3}}{2}\right\}$

(D) $\{-1 \pm i\sqrt{3}\}$

---- (20) Solve the inequality. Write the solution in interval notation. Graph the solution.

$$12K - (-3) + 16 \geq -20K - 77$$

(A) $[-3, \infty)$

(B) $(-\infty, -3]$

(C) $\left[-\frac{45}{16}, \infty\right)$

(D) $[3, \infty)$

---- (21) Solve the inequality. Write the answer in interval notation.

$$X^2 - X - 6 < 0$$

(A) $(-\infty, -6) \cup (0, \infty)$

(B) $(-\infty, -2) \cup (3, \infty)$

(C) $(-2, 3)$

(D) $[-2, 3]$

_____ (22) Solve the inequality. Write your answer in interval notation.

$$\frac{2X - 7}{X - 5} \leq 3$$

- (A) $(-\infty, 5) \cup [8, \infty)$ (B) $(-\infty, 5] \cup [8, \infty)$
(C) $(5, 8]$ (D) $[-8, 5)$
-

_____ (23) Solve the equation.

$$|3X + 2| = 7$$

- (A) $\{3\}$ (B) $\{-\frac{5}{3}, 3\}$
(C) $\{\frac{5}{3}, -3\}$ (D) \emptyset
-

_____ (24) Solve the inequality. Write your answer in interval notation.

$$|X - 5| < 2$$

- (A) $(-\infty, -10)$ (B) $(3, 7)$
(C) $(-\infty, 3) \cup (7, \infty)$ (D) \emptyset

_____ (25) Solve the inequality. Write your answer in interval notation.

$$|X + 3| - 100 \geq -93$$

(A) $[193, \infty)$

(B) $(-\infty, -10] \cup [4, \infty)$

(C) $[-10, 4]$

(D) \emptyset

_____ (26) Perform the indicated operations.

$$(1 - i) - (2 - 2i) + (3 - 3i)$$

(A) $2 - 6i$

(B) $2 + 2i$

(C) 0

(D) $2 - 2i$

_____ (27) Perform the indicated operation.

$$\frac{3 - 2i}{2 - 3i}$$

(A) $\frac{3}{2} + \frac{3}{2}i$

(B) $\frac{-13i}{-5-12i}$

(C) $\frac{12+5i}{13}$

(D) $0 - i$

— (28) Find the domain and the range of the function.

$$Y = \sqrt{2X + 14}$$

- | | |
|---|--|
| (A) Domain; Range
$(-\infty, \infty); (-\infty, \infty)$ | (B) Domain; Range
$[-7, \infty); (-\infty, \infty)$ |
| (C) Domain; Range
$[-7, \infty); [0, \infty)$ | (D) Domain; Range
$[7, \infty); [0, \infty)$ |
-

— (29) Find the distance between points P and Q .

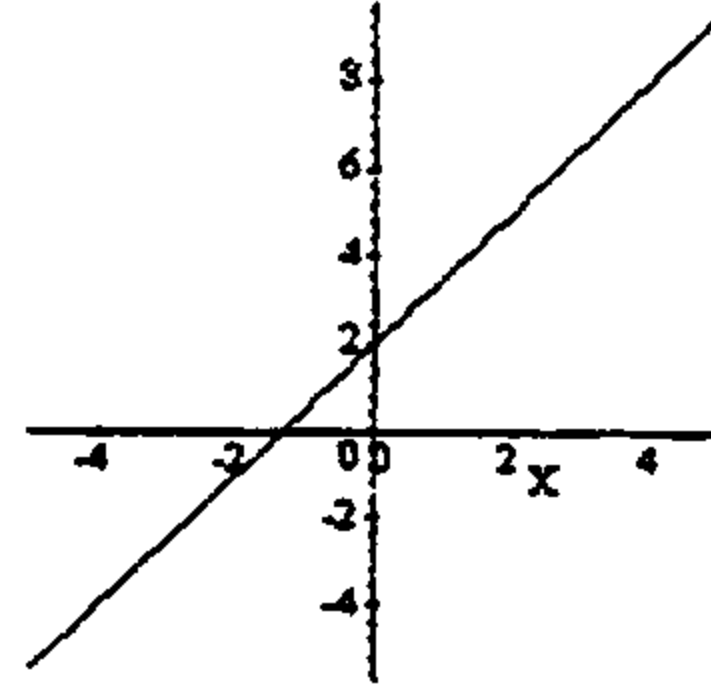
$$P(-3, -1), Q(2, -1)$$

- | | |
|-----------------|-----------------|
| (A) $\sqrt{29}$ | (B) 5 |
| (C) 1 | (D) $\sqrt{21}$ |

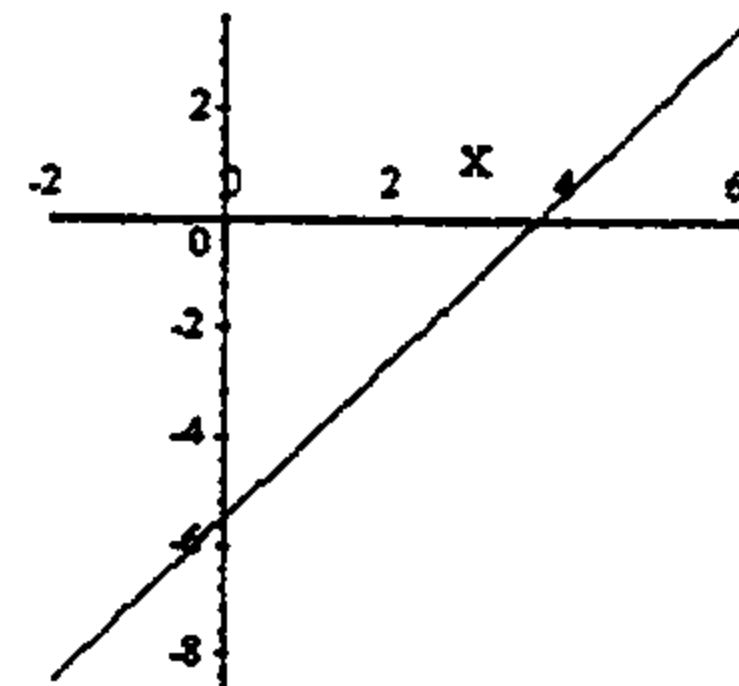
— (30) Graph the line with the given slope, passing through the point.

$$\text{Through } (2, 5), \quad m = \frac{2}{3}$$

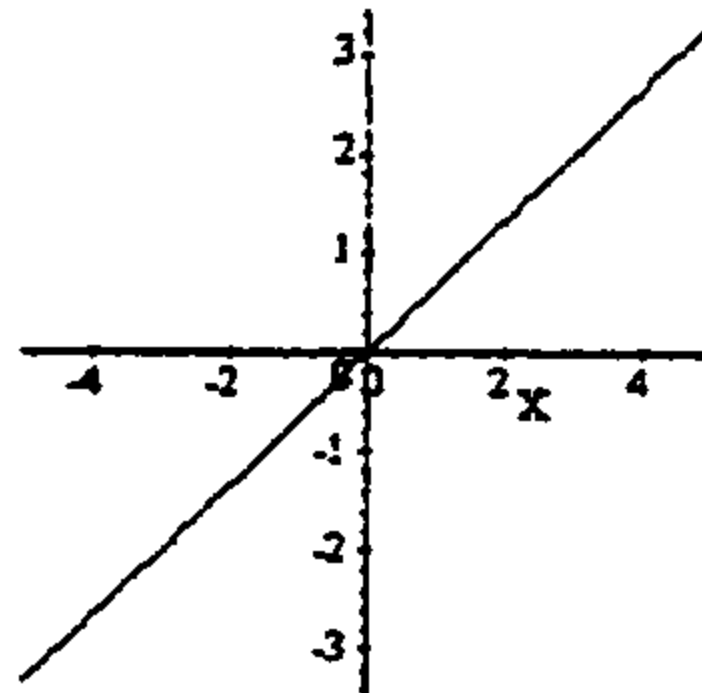
(A)



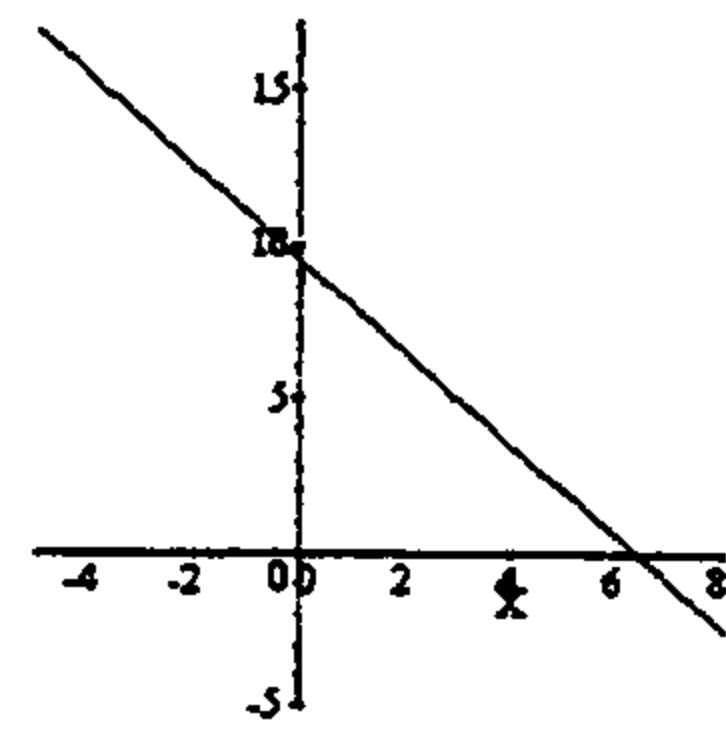
(B)



(C)



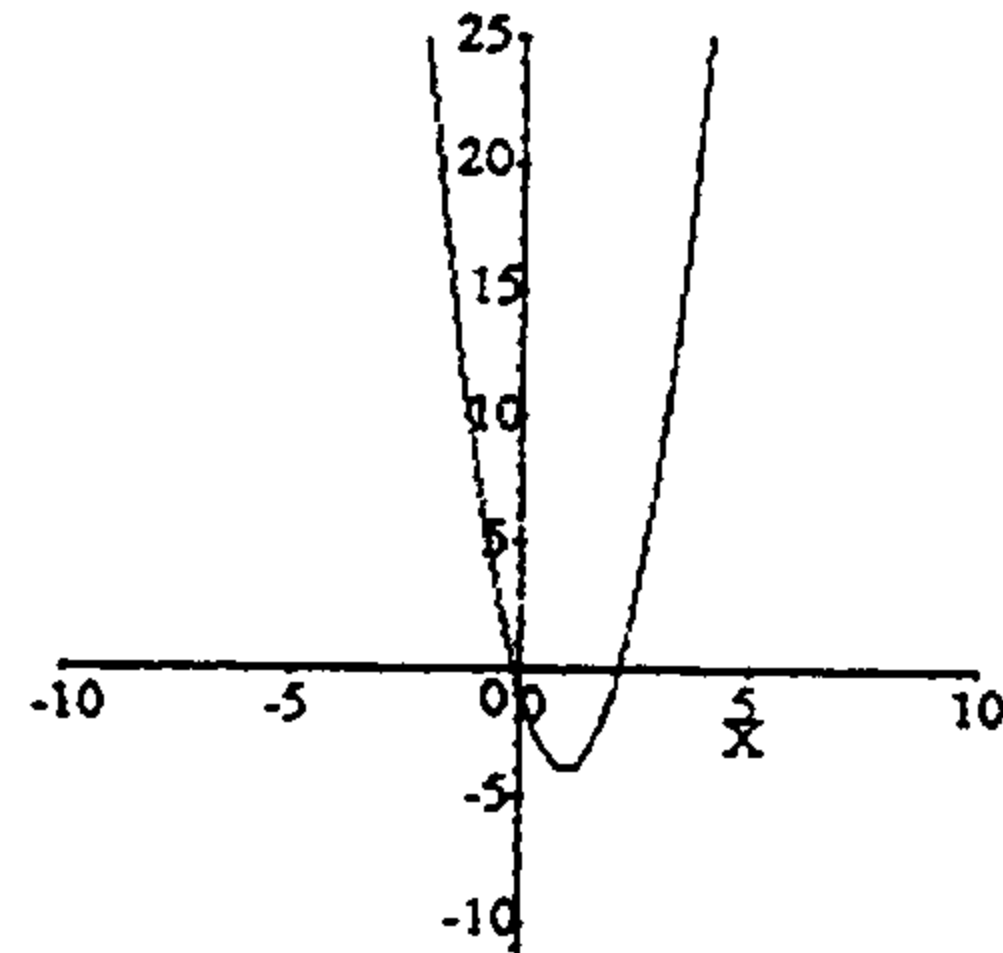
(D)



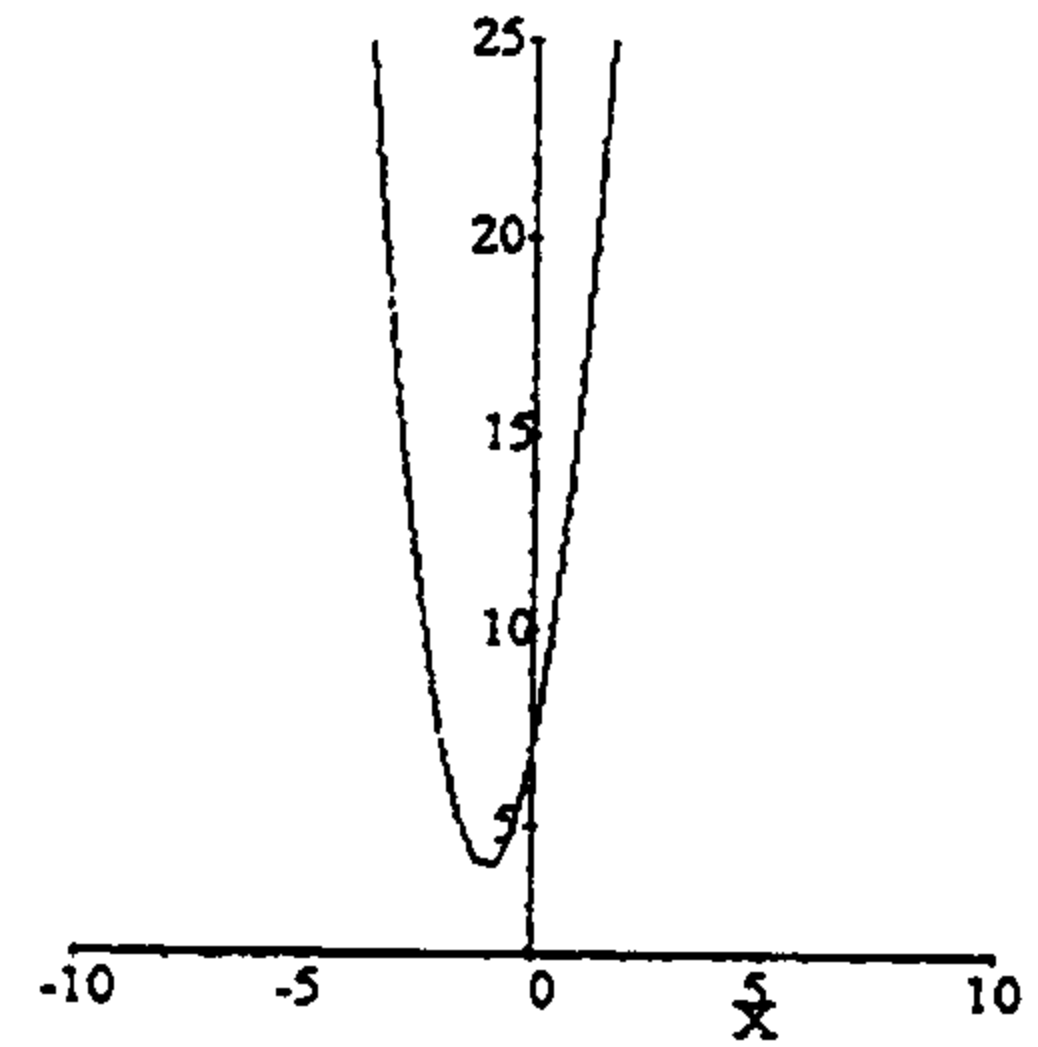
— (31) Graph the parabola and give the vertex.

$$Y = 3X^2 + 6X - 1$$

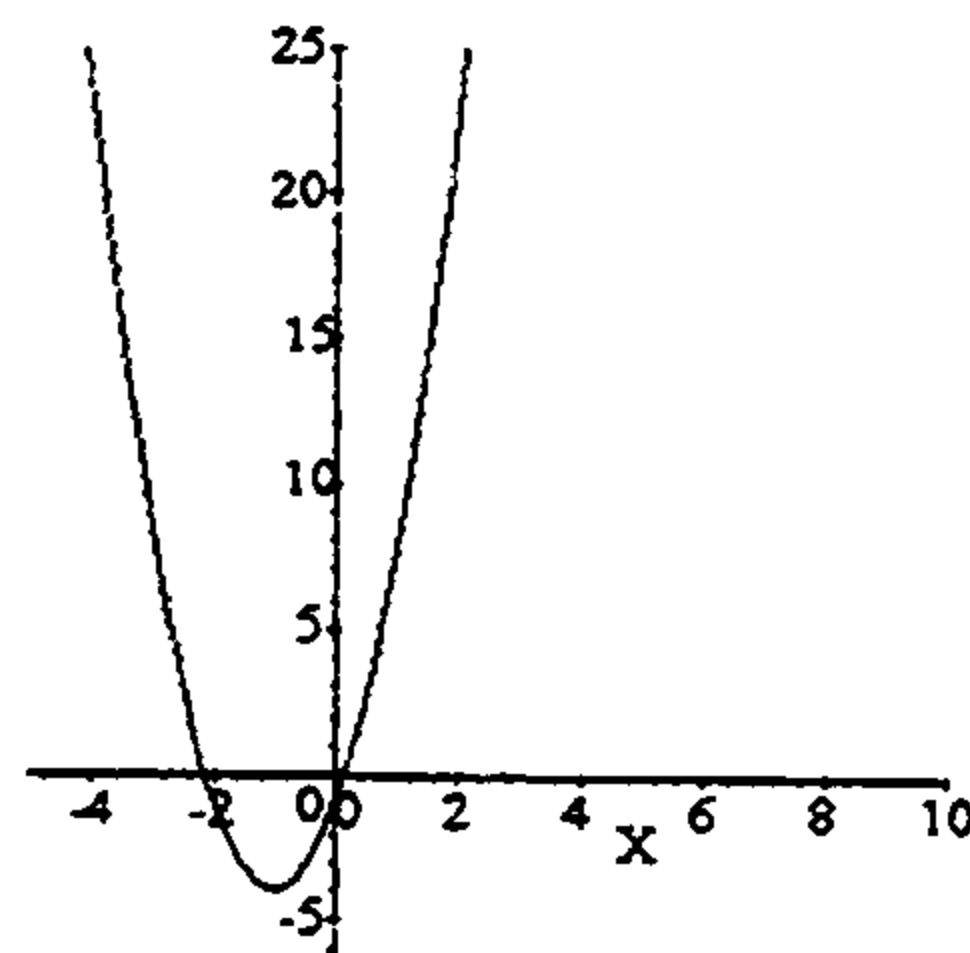
(A) Vertex $(1, -4)$



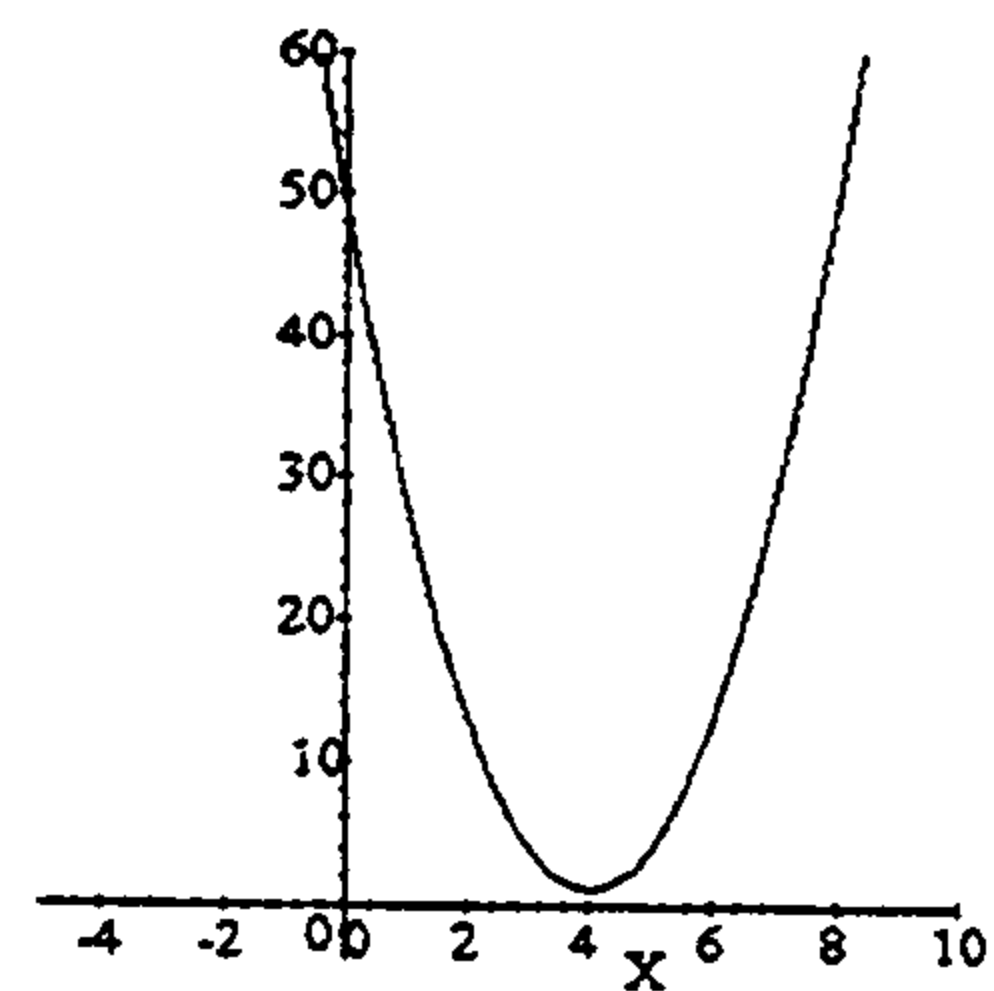
(B) Vertex $(-1, 4)$



(C) Vertex $(-1, -4)$



(D) Vertex $(4, 1)$



----- (32) Find the vertex, axis, and direction of opening.

$$Y = 5(X - 6)^2 - 7$$

- (A) Vertex $(6, -7)$, axis $X = 6$, opens up
 - (B) Vertex $(6, -7)$, axis $X = 6$, opens down
 - (C) Vertex $(-6, -7)$, axis $X = 7$, opens up
 - (D) Vertex $(6, -7)$, axis $X = 5$, opens up
-

----- (33) Find the indicated function values.

Given $f(X) = -4X^2 - 6X + 50$, find $f((-2))$

- (A) 46 (B) -46 (C) 22 (D) 54
-

----- (34) Find the domain of the function.

$$f(X) = \frac{X - 2}{3 - X}$$

- (A) $(-\infty, \infty)$
- (B) $(-\infty, -3) \cup (-3, \infty)$
- (C) $(-\infty, 2) \cup (2, 3) \cup (3, \infty)$
- (D) $(-\infty, 3) \cup (3, \infty)$

— (35) Find the indicated composite for the pair of functions.

$$f(X) = 3X - 3 \text{ and } g(X) = 4X - 4$$

Find $(g \circ f)(X)$

(A) $12X - 7$

(B) $12X - 15$

(C) $12X - 16$

(D) $7X - 7$

— (36) Write the equation of the line through $(4, -11)$ with $m = \frac{4}{5}$.
Leave your answer in standard form.

(A) $4X - 5Y = -64$

(B) $4X - 5Y = 71$

(C) $4X - 5Y = -39$

(D) $4X - 5Y = 59$

— (37) Give the slope and the y-intercept of the line.

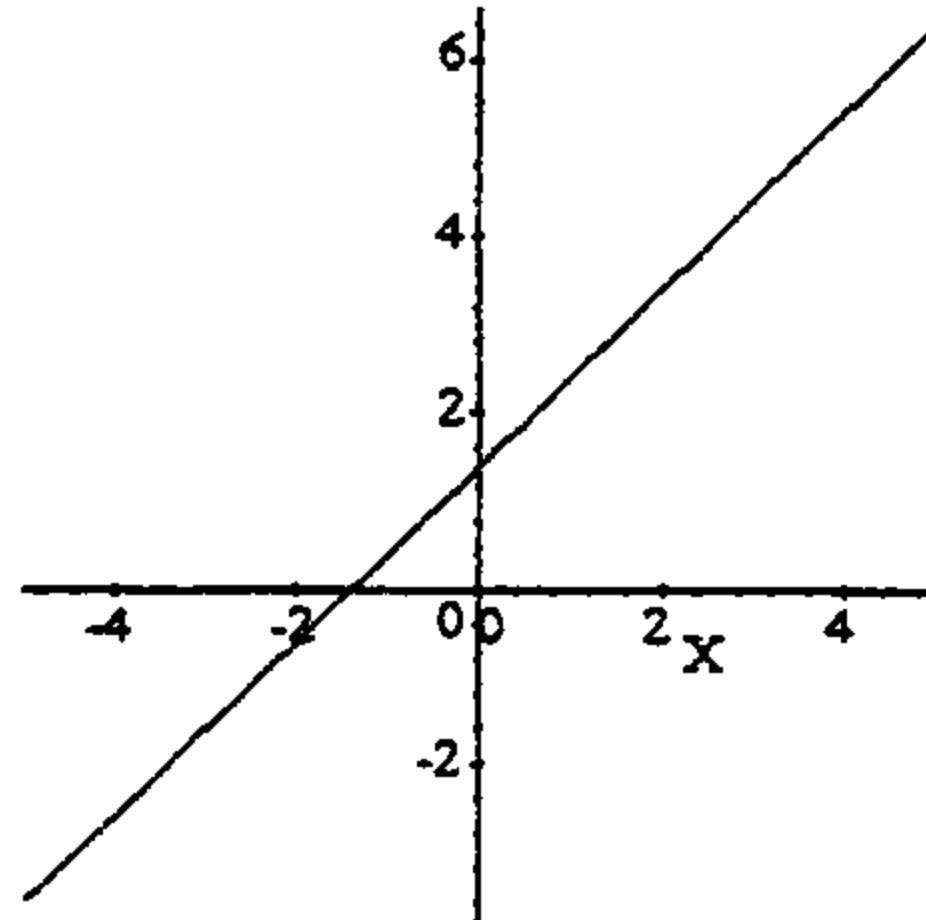
$$\frac{1}{2}X + \frac{2}{3}Y = \frac{1}{4}$$

- (A) $m = -\frac{3}{4}$; y -intercept = $\frac{3}{8}$
(B) $m = -\frac{3}{4}$; y -intercept = 3
(C) $m = \frac{2}{3}$; y -intercept = $\frac{1}{4}$
(D) $m = \frac{4}{3}$; y -intercept = $\frac{3}{8}$

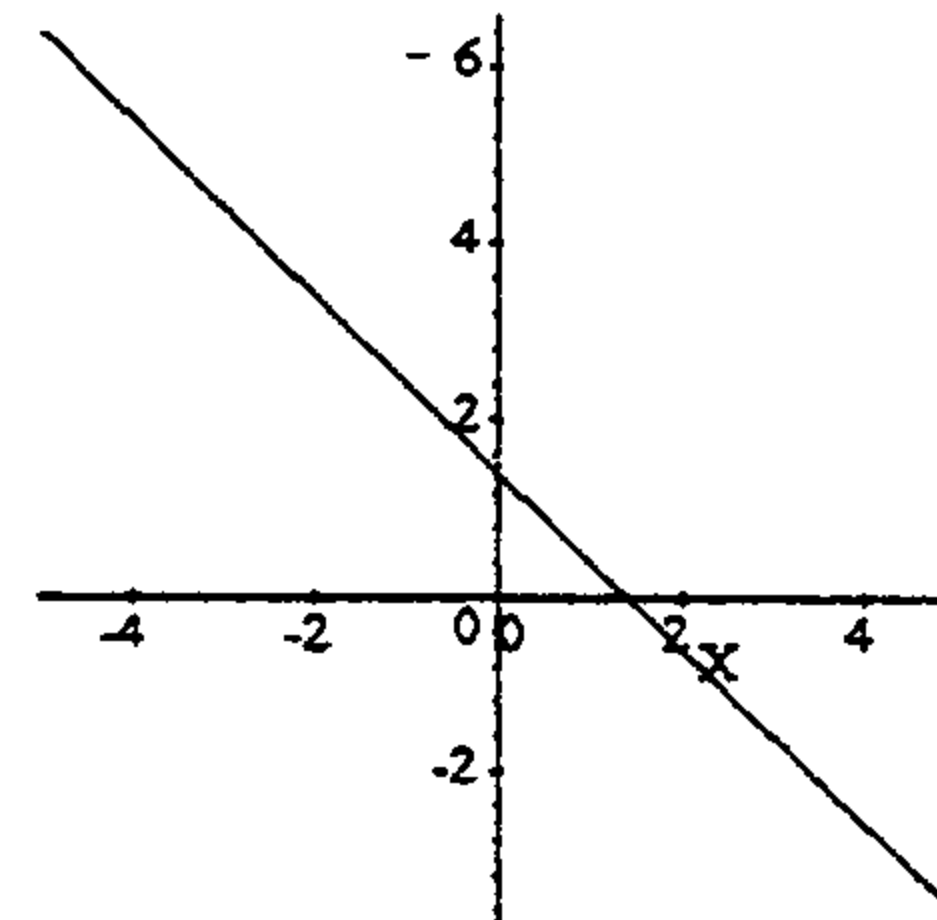
— (38) Graph the linear equation.

$$-5X - 5Y = 7$$

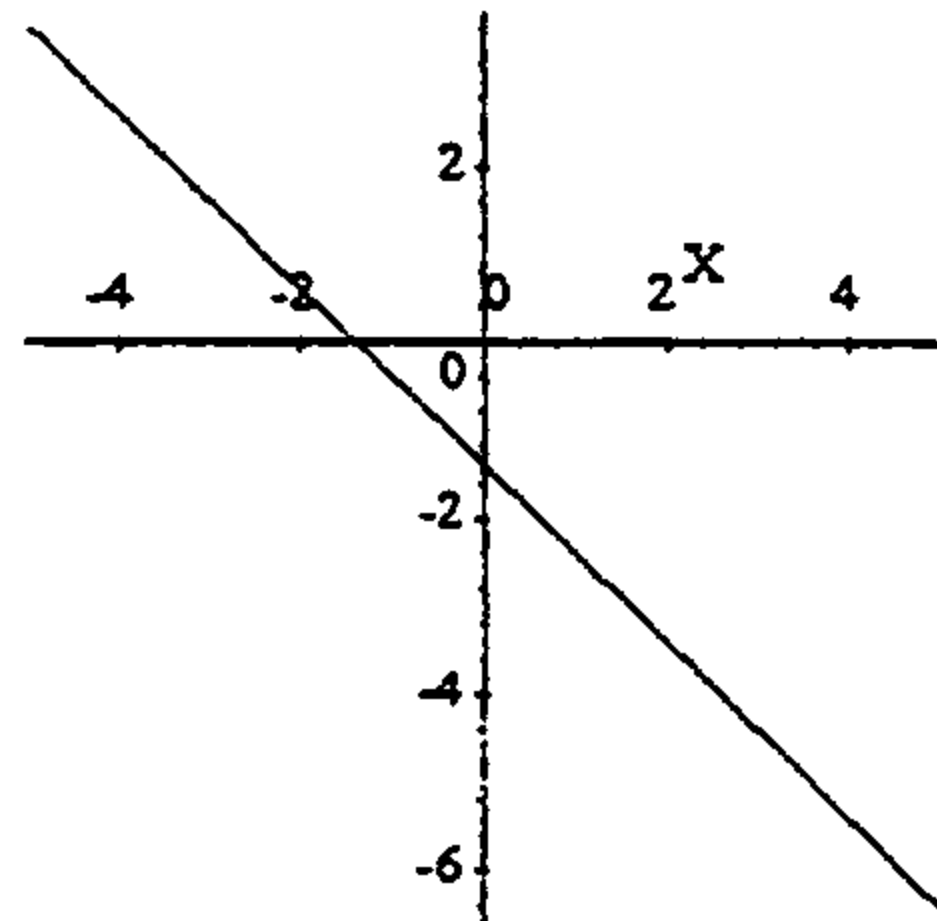
(A)



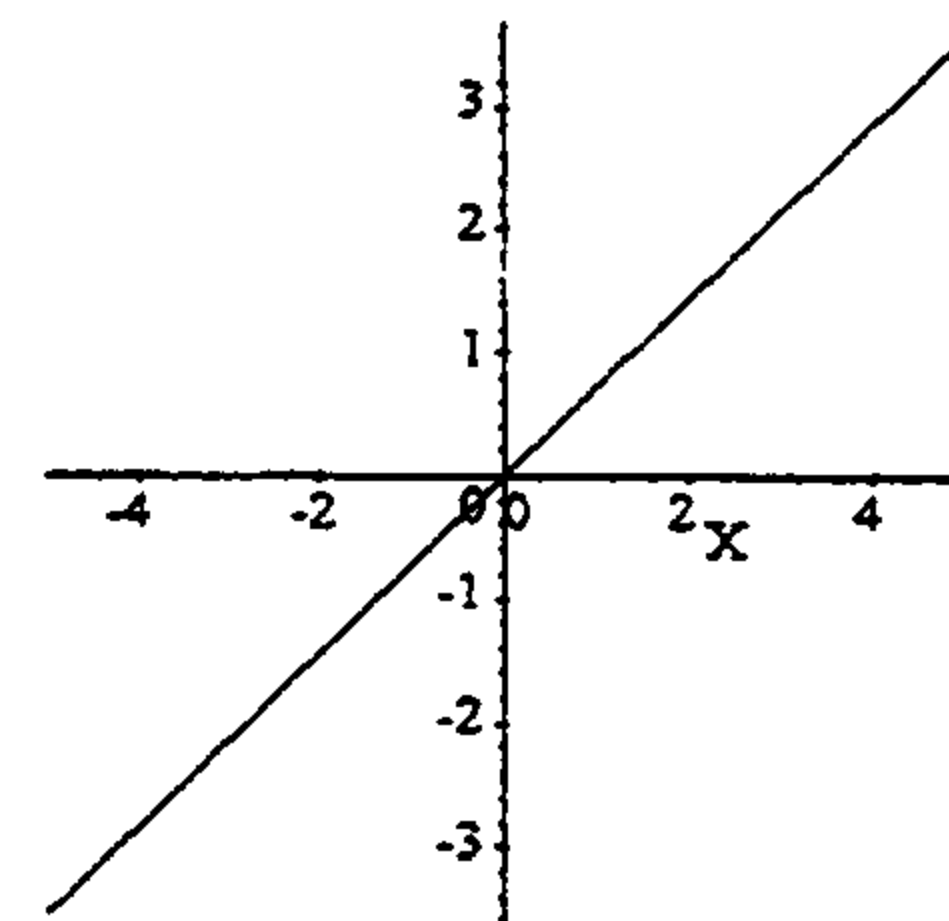
(B)



(C)



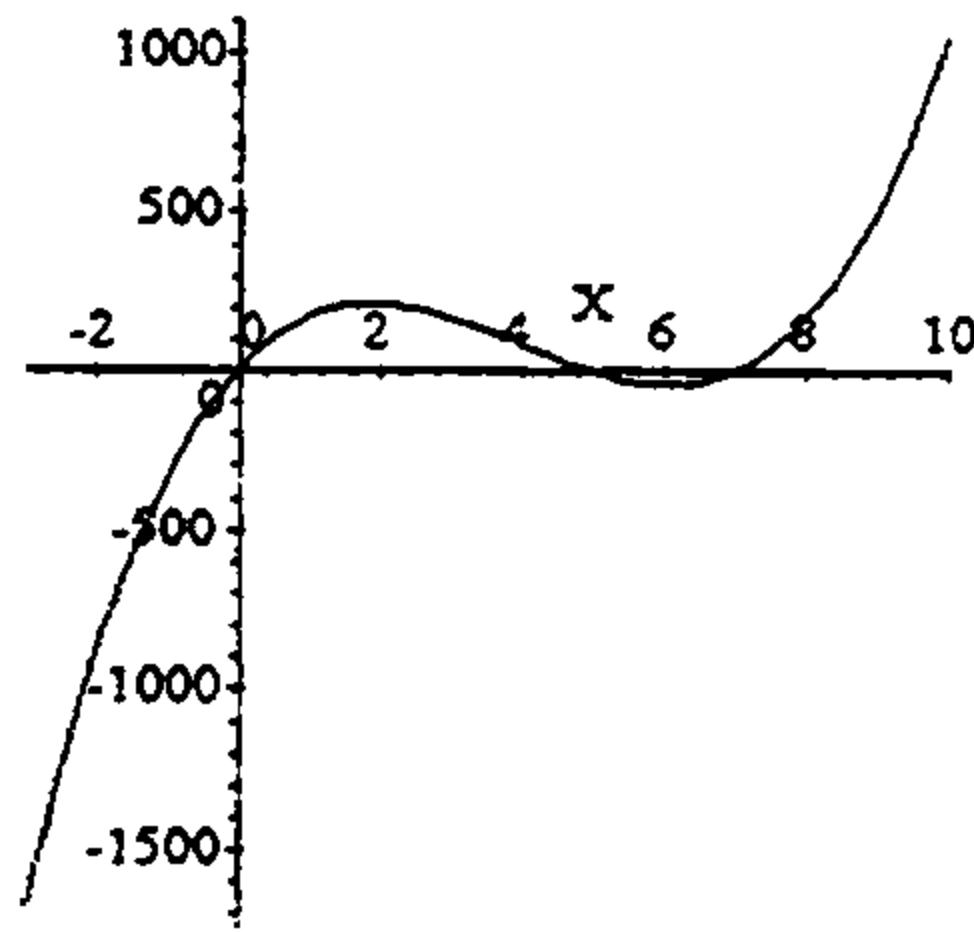
(D)



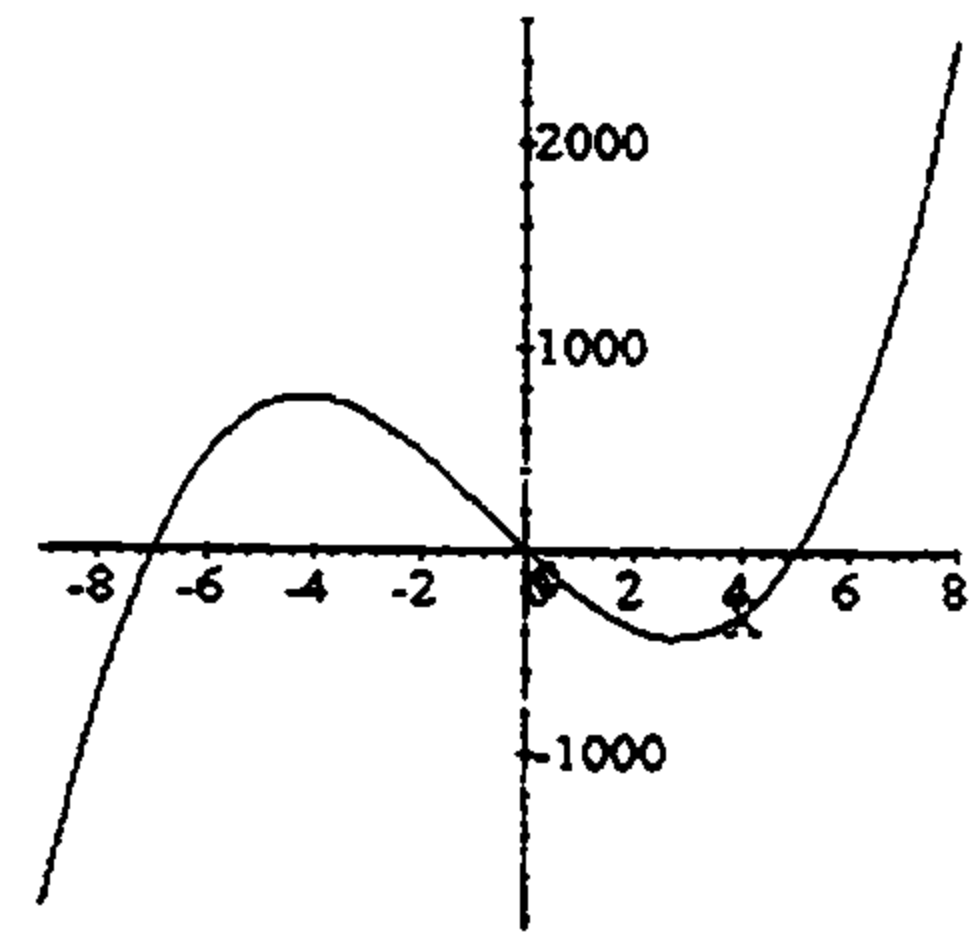
— (39) Graph.

$$P(X) = 7X(X - 5)(X + 7)$$

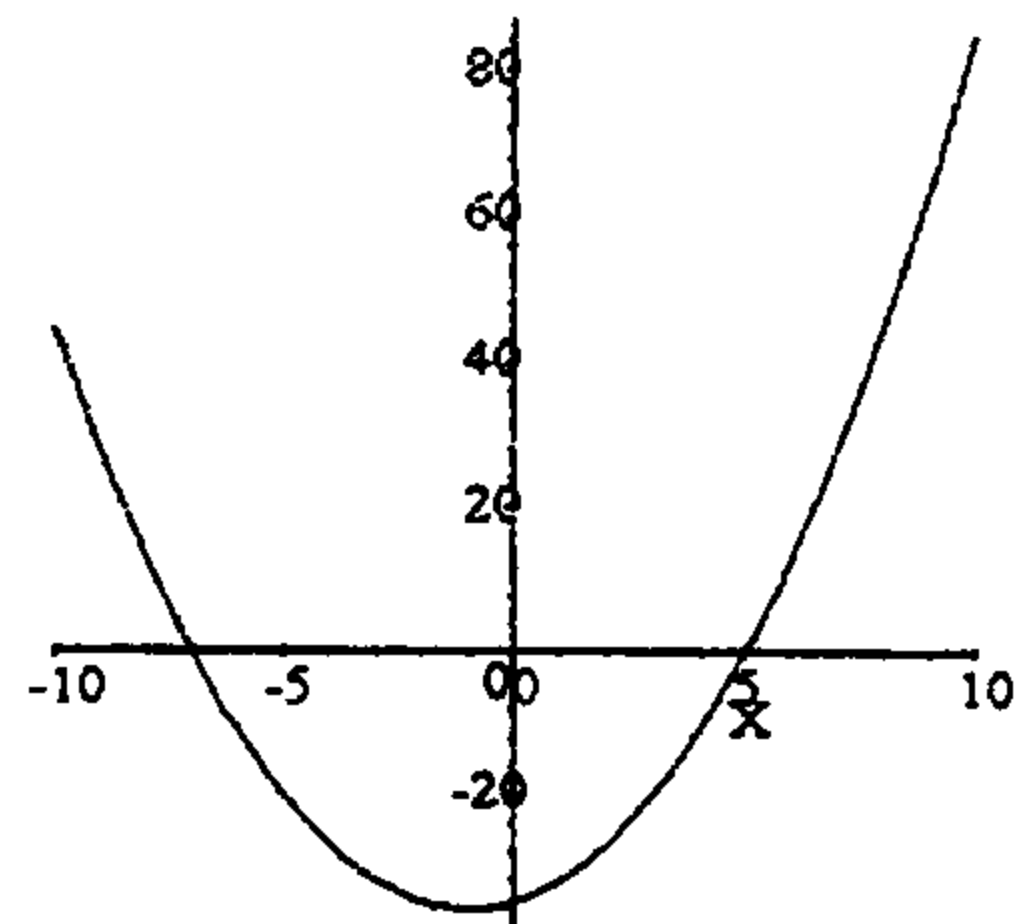
(A)



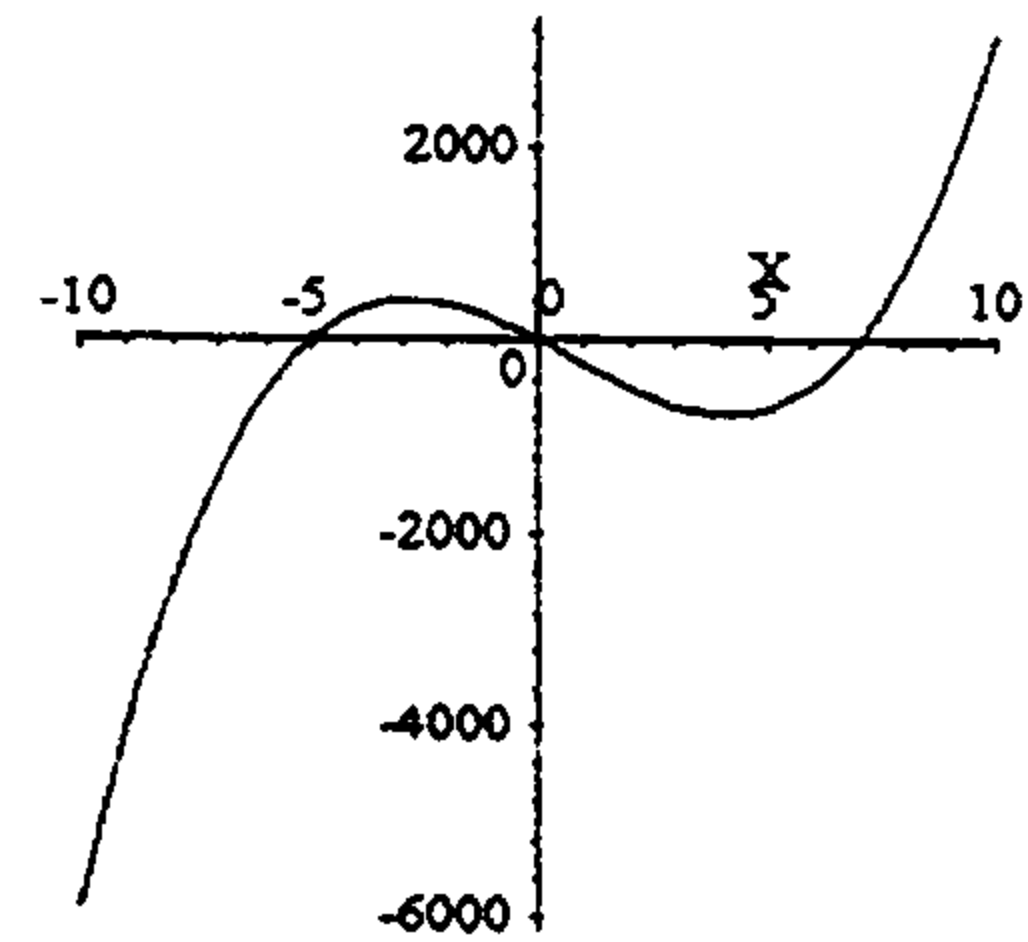
(B)



(C)



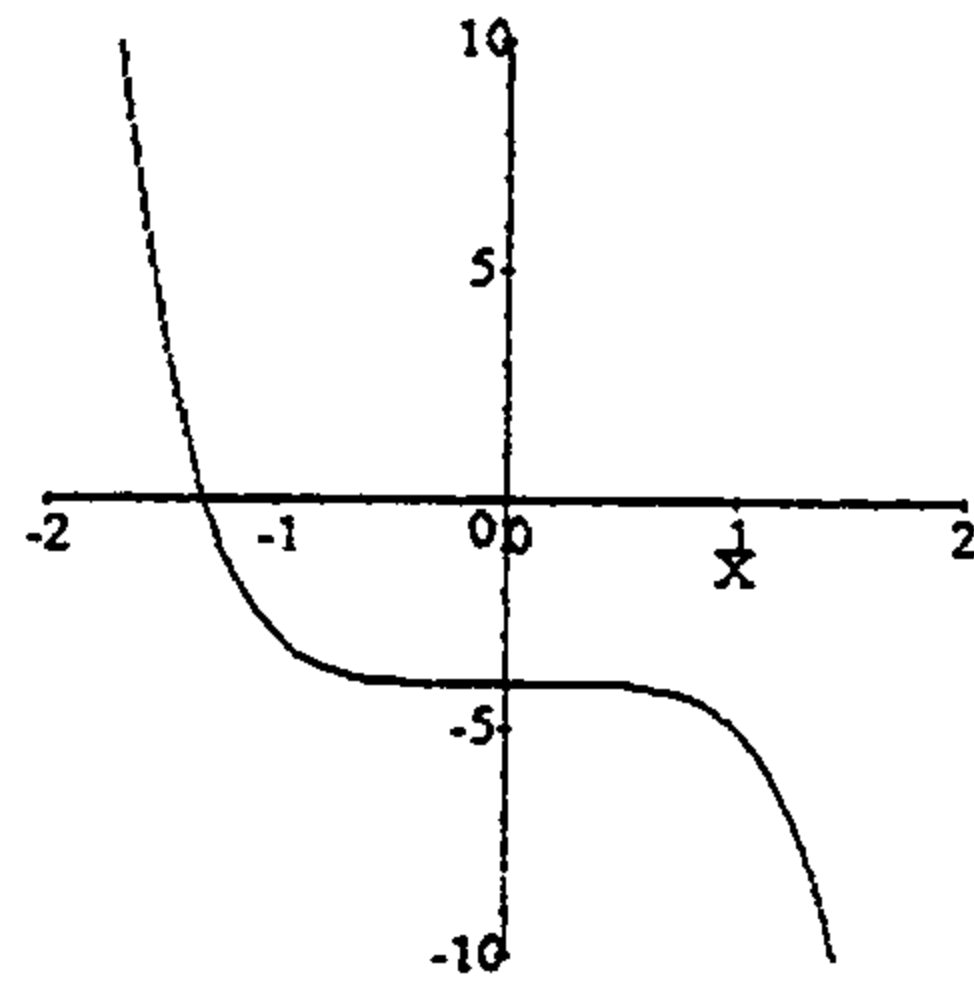
(D)



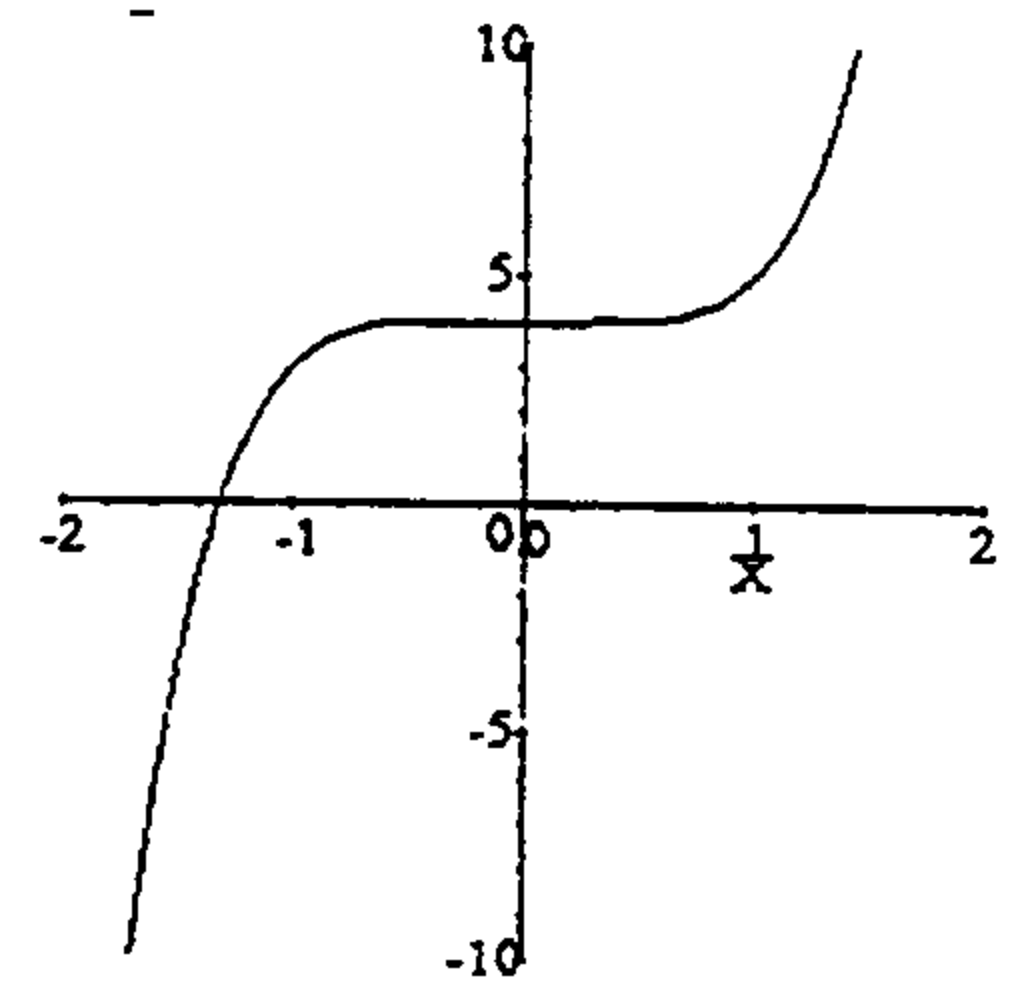
— (40) Graph.

$$P(X) = X^5 - 4$$

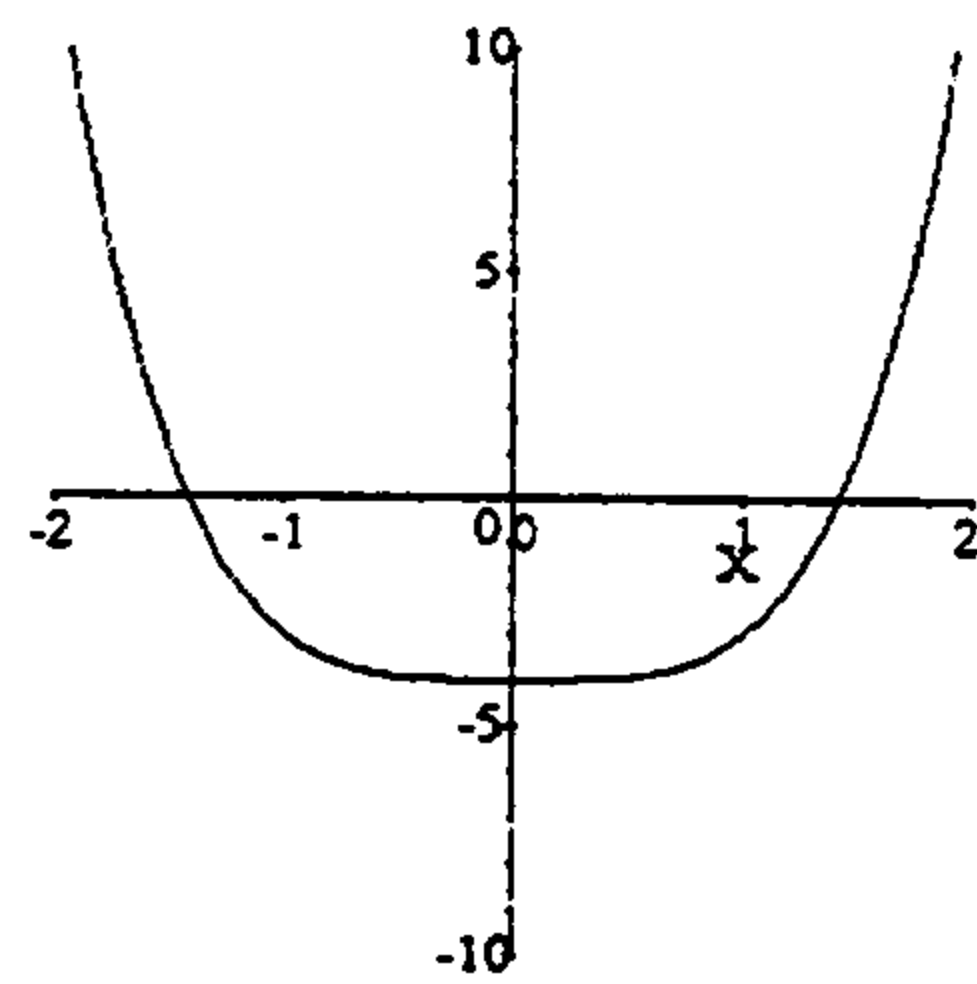
(A)



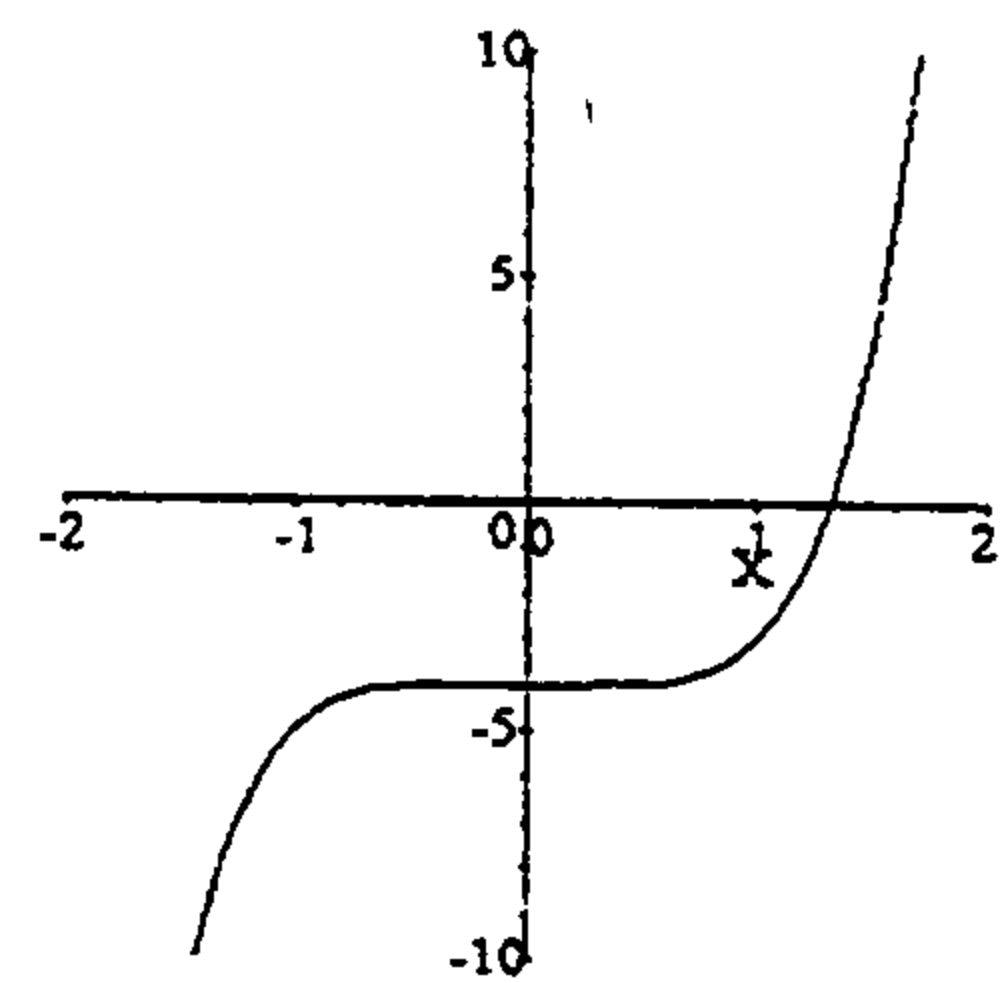
(B)



(C)



(D)



— (41) Factor $P(X) = X^3 - 8X^2 - 43X + 110$ into linear factors given that K is a zero of P and $K = 2$.

- (A) $(X + 2)(X - 11)(X + 5)$
 - (B) $(X - 2)(X - 6)(X - 55)$
 - (C) $(X - 2)(X + 11)(X - 5)$
 - (D) $(X - 2)(X - 11)(X + 5)$
-

— (42) Use the factor theorem to decide whether or not the second polynomial is a factor of the first.

$$X^4 - 2X^3 - 13X^2 - 6X - 20 ; X - 5$$

- (A) *yes*
 - (B) *no*
-

— (43) Solve the system.

$$-15X + 5Y = -35$$

$$10X - 5Y = 25$$

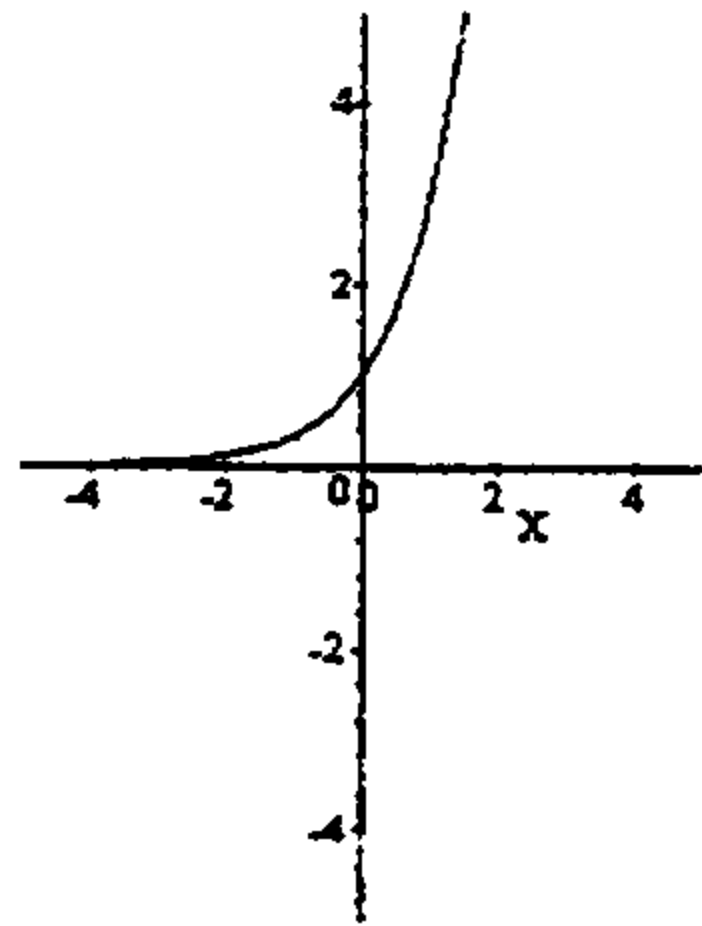
- (A) $\{\emptyset\}$
- (B) $\left\{\left(\frac{2}{5}, \frac{7}{5}\right)\right\}$
- (C) $\{(-1, 2)\}$
- (D) $\{(2, -1)\}$

____ (44) Give the correct synthetic division for the problem.

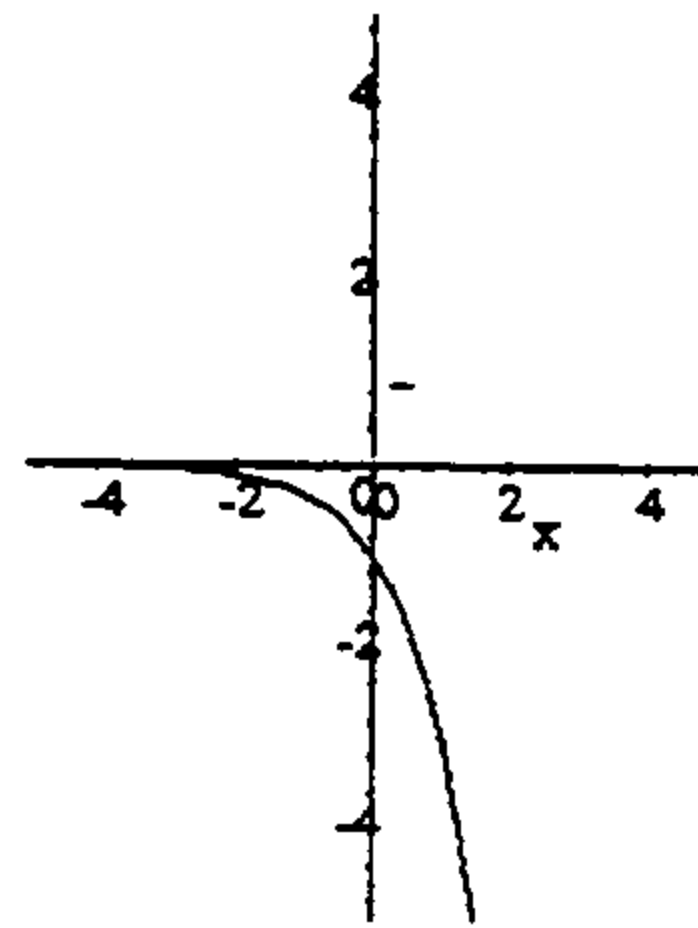
$$\frac{X^4 - 2X^3 + X^2 - 15X + 26}{X - 3}$$

- (A) $X^3 + X^2 + 4X - 3 r 17$ (B) $X^4 + X^3 + 4X^2 - 3X + 17$
(C) $X^3 + X^2 + 4X + 3 r 35$ (D) cannot be divided by synthetic
division

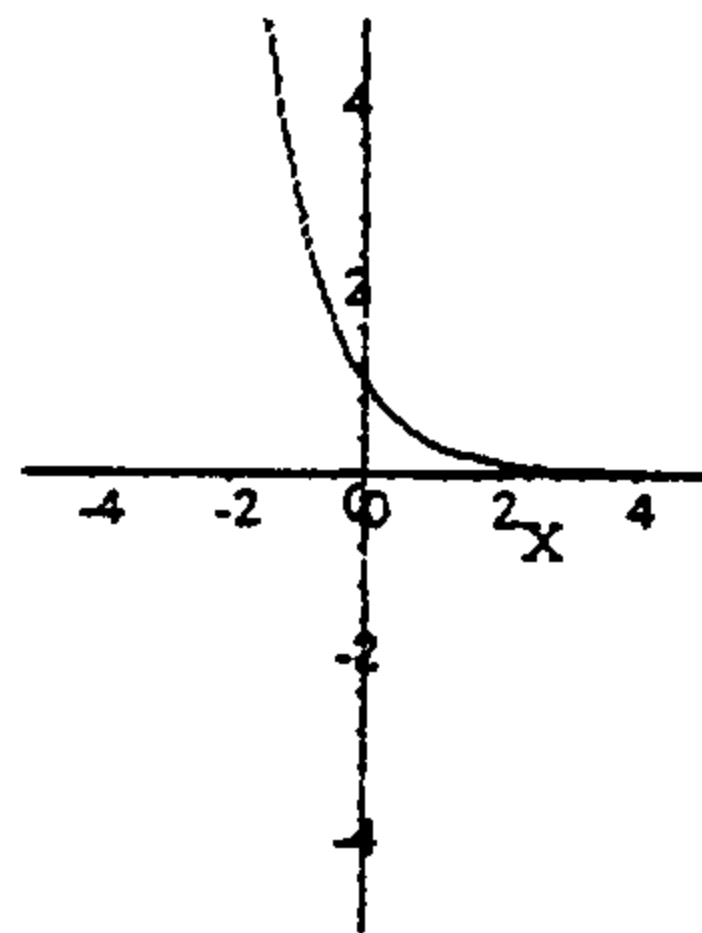
— (45) Graph the function.
 (A)



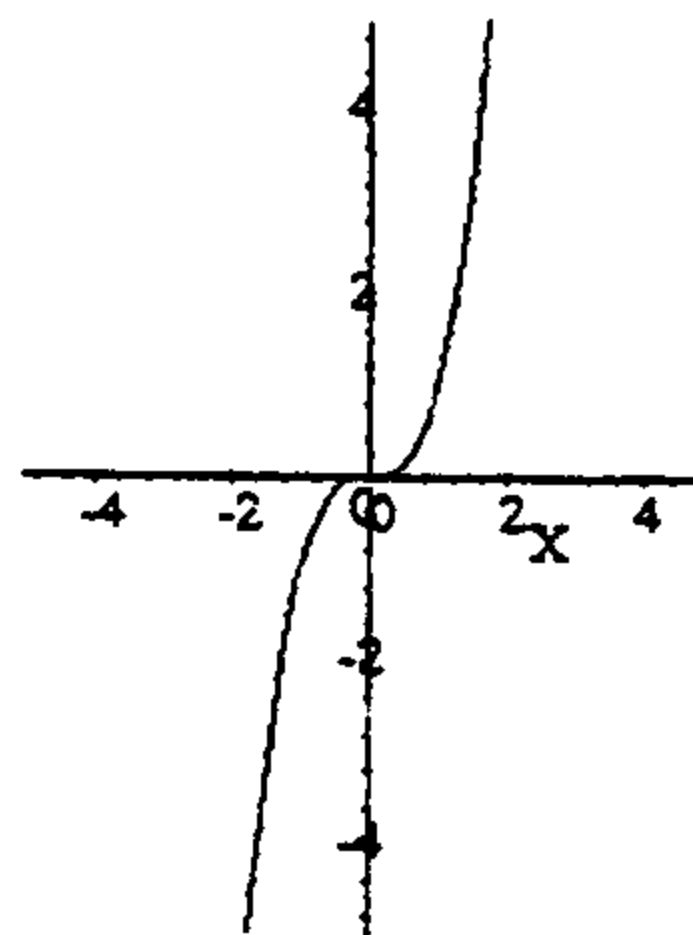
(B) $f(X) = 3^X$



(C)



(D)



— (46) Solve the equation below. Leave you answer in terms of ln.

$$4^X = 12$$

- (A) $(\ln 12) - (\ln 4)$ (B) $\frac{\ln 12}{\ln 4}$ (C) $\ln 3$ (D) $\frac{\ln 12}{4}$

— (47) Given that $\ln(n+3) = \ln(n+9) - \ln 2$ find n .

- (A) \emptyset (B) -15 (C) 10 (D) 3
-

— (48) Write the expression below as a single log or express as a number.

$$4\log_3 X + \log_3 Y - \log_3 5$$

- (A) $\log_3(-20XY)$ (B) $\log_3(-5)X^4Y$ (C) $\log_3\frac{X^4Y}{5}$ (D) $\log_3(-20XY)$
-

— (49) Simplify.

$$(\sqrt{Y} - \sqrt{3})^2$$

- (A) $Y-3$ (B) Y^2-9 (C) $Y-2\sqrt{3Y}+3$ (D) $Y-\sqrt{6Y}+3$
-

— (50) Solve the equation $9X^2 + 30X + 25 = 0$.

- (A) $\left\{\frac{9}{25}, 1\right\}$ (B) $\left\{-\frac{5}{3}\right\}$ (C) $\left\{-\frac{3}{5}, \frac{3}{5}\right\}$ (D) $\left\{-\frac{5}{9}\right\}$
-

— (51) Find the distance $d(P, Q)$ $P(1, 12), Q(6, 0)$

- (A) $\sqrt{37}$ (B) $\sqrt{157}$ (C) 13 (D) 169

— (52) Factor as completely as possible. $2X^2 + X - 15$

(A) $(2X - 5)(X + 3)$ (B) $(2X - 1)(X + 15)$

(C) $(2X + 15)(X - 1)$ (D) $(2X + 1)(X - 15)$

— (53) Factor by grouping. $X^3 - 2X^2 - 3X + 6$

(A) $(X^2 - 2)(X - 3)$ (B) $(X^2 + 3)(X - 2)$

(C) $(X - 2)(X^2 - 3)$ (D) $X(X - 2)(X - 3)$

— (54) Perform the indicated operations.

$$\frac{1}{X} + \frac{1}{Y} + \frac{1}{Z}$$

(A) 1 (B) $\frac{YZ+XZ+XY}{XYZ}$

(C) $\frac{X+Y+Z}{XYZ}$ (D) $\frac{1}{XYZ}$

— (55) Perform the indicated operation.

$$\frac{X^3 - 8}{X^2 - 4} \div \frac{X^2 + 2X + 4}{X^3 + 8}$$

(A) $X^2 - 2X + 4$ (B) $X^2 + 2X - 4$

(C) $(X - 2)(X + 2)$ (D) $(X + 2)(X^2 + 2X + 2)$

— (56) Perform the indicated operation.

$$\frac{3M - 3}{M^2} \cdot \frac{M^5}{1 - M}$$

(A) $3M^3$

(B) $-3M^3$

(C) $\frac{M^3(M-1)}{3(1-M)}$

(D) $\frac{M^3(3M-3)}{(1-M)}$

— (57) Perform the indicated operation.

$$\left(\frac{25}{16}\right)^{-\frac{1}{2}}$$

(A) $-\frac{5}{4}$

(B) $\frac{8}{125}$

(C) $\frac{5}{4}$

(D) $\frac{4}{5}$

— (58) Perform the indicated operation.

$$\frac{\frac{X}{X-Y} - \frac{Y}{X+Y}}{\frac{Y}{X-Y} + \frac{X}{X+Y}}$$

(A) $\frac{X-Y}{X+Y}$

(B) $\frac{(X-Y)^2}{(X+Y)^2}$

(C) 1

(D) $\frac{X}{Y}$

____ (59) Simplify the expression.

$$-1296^{-\frac{1}{4}}$$

(A) -324

(B) $\frac{1}{6}$

(C) $-\frac{1}{6}$

(D) -6

____ (60) Perform the indicated operations. Write answers using only positive exponents.

$$\left(13^{\frac{3}{5}}\right)^{10}$$

(A) 13^6

(B) $\left(\frac{13}{5}\right)^{30}$

(C) $13^{\frac{13}{5}}$

(D) 65^{13}

____ (61) Perform the indicated operations. Write answers using only positive exponents.

$$\frac{\left(5^{\frac{1}{2}}\right)^{-\frac{2}{3}}}{5^{\frac{1}{6}} \cdot 5^{\frac{2}{6}}}$$

(A) $\frac{1}{5^{18}}$

(B) $\frac{1}{5^{\frac{5}{6}}}$

(C) $\frac{1}{5^{12}}$

(D) $5^{\frac{5}{6}}$

____ (62) Simplify. Assume all variables are positive real numbers.

$$\sqrt[4]{48M^{10}N^8K^3}$$

(A) $12M^2N^2\sqrt[4]{M^2K^3}$

(B) $2M^2N^2\sqrt[4]{3M^2K^3}$

(C) $4M^5N^4K\sqrt[4]{3K}$

(D) Cannot be simplified.

____ (63) Perform the indicated operations. Write answers using positive exponents. Assume variables represent positive real numbers.

$$P^{\frac{2}{3}}(P^{\frac{1}{2}} + P^3)$$

(A) $P^{\frac{9}{2}}$

(B) $P^{\frac{1}{3}} + P^2$

(C) $P^{\frac{7}{6}} + P^{\frac{11}{3}}$

(D) P

____ (64) Simplify.

$$\sqrt{45} + \sqrt{80} - \sqrt{500}$$

(A) $\sqrt{-375} = 5i\sqrt{15}$

(B) $-15\sqrt{5}$

(C) $-3\sqrt{5}$

(D) $-120\sqrt{5}$

- (65) Rationalize the denominator. Assume all variables are non-negative numbers.

$$\frac{3\sqrt{b}}{\sqrt{8}}$$

- (A) $\frac{3\sqrt{2b}}{4}$ (B) $\frac{9b}{8}$
(C) $\frac{3\sqrt{b}}{4}$ (D) $3\sqrt{8b}$
-

- (66) Solve the equation.

$$\frac{K-2}{4} = \frac{K+8}{3}$$

- (A) *no solution* (B) $K = -38$
(C) $\frac{-6 \pm \sqrt{37}}{2}$ (D) $K = 26$
-

- (67) Solve the equation for t .

$$5(2t - k) + a = 13t + k$$

- (A) $t = \frac{a-2k}{t}$ (B) $t = \frac{a}{3}$
(C) $t = \frac{a-6k}{3}$ (D) $t = a - 2k$

— (68) Solve the problem.

Pearline invested \$25,000 in an account that pays 9% simple interest. How much additional money must Pearline invest in an account that pays 12% simple interest so that the average return on the two investments amounts to 10%.

(A) \$13,000

(B) -\$10,000

(C) \$50,000

(D) \$12,500

— (69) How many gallons of a 40% antifreeze solution must be mixed with 100 gallons of a 90% solution to get a 50% solution?

(A) 200 gallons

(B) 100 gallons

(C) 400 gallons

(D) 895 gallons

Answers

- | | | | |
|-------|-------|-------|-------|
| 1. C | 18. C | 35. C | 52. A |
| 2. B | 19. C | 36. B | 53. C |
| 3. D | 20. A | 37. A | 54. B |
| 4. A | 21. C | 38. C | 55. A |
| 5. B | 22. A | 39. B | 56. B |
| 6. C | 23. C | 40. D | 57. D |
| 7. A | 24. B | 41. D | 58. C |
| 8. D | 25. B | 42. A | 59. C |
| 9. A | 26. D | 43. D | 60. A |
| 10. D | 27. C | 44. A | 61. B |
| 11. C | 28. C | 45. A | 62. B |
| 12. B | 29. B | 46. B | 63. C |
| 13. A | 30. A | 47. D | 64. C |
| 14. B | 31. C | 48. C | 65. A |
| 15. A | 32. A | 49. C | 66. B |
| 16. D | 33. A | 50. B | 67. C |
| 17. D | 34. D | 51. C | 68. D |
| | | | 69. C |