

DEPARTMENTAL FINAL EXAM—MATH 125 FALL08

VERSION 1

TEST# _____

DO NOT WRITE ON EXAM

1. Write an equation of the line through the point (5, 1) that is perpendicular to the line $3x - 5y = 5$.

A) $3x - 5y = 10$
B) $-5x + 3y = -22$
C) $3x + 5y = 20$
D) $-3x + 5y = 5$
E) $-5x - 3y = -28$

2. Multiply and simplify.

$$\frac{4}{5+8x} \cdot (45+72x)$$

A) 36, $x \neq -\frac{5}{8}$
B) 32, $x \neq -\frac{8}{5}$
C) 20, $x \neq 0$
D) 45, $x \neq \frac{5}{8}$
E) 40, $x \neq \frac{8}{5}$

3. Divide and simplify.

$$\frac{x^2+100}{9(x+5)} \div \frac{x+10}{9(x^2-25)}$$

A) $\frac{(x+5)(x^2+100)}{81(x+10)}$, $x \neq 5$
B) $\frac{x+10}{x+5}$, $x \neq 9$, $x \neq 10$
C) $(x-5)(x-10)$, $x \neq -9$, $x \neq -5$
D) $\frac{(x-5)(x^2+100)}{x+10}$, $x \neq -5$
E) $\frac{9(x-5)}{x-10}$, $x \neq -9$, $x \neq 10$

4. Radioactive carbon, ^{14}C , has a half-life of 5730 years. After 1000 years, 3.00 grams remain.

What was the initial quantity of ^{14}C ? Round your answer to two decimal places.

- A) 3.39 grams
- B) 3.30 grams
- C) 5.66 grams
- D) 3.16 grams
- E) 3.52 grams

5. Use the Quadratic Formula to solve $12x^2 - 12x + 3 = 0$.

- A) $x = -\frac{1}{2}$
- B) $x = 12\sqrt{2}$
- C) $x = \frac{1}{2}$
- D) $x = \frac{1}{2} \pm 12\sqrt{2}$
- E) no solutions

6. Find the domain of the rational function.

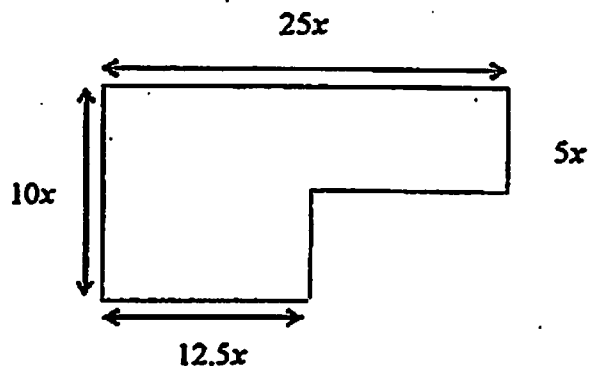
$$h(t) = \frac{2t^2}{t^2 - 3t - 54}$$

- A) $(-\infty, -6) \cup (-6, 9) \cup (9, \infty)$
- B) $(-\infty, 0) \cup (0, \infty)$
- C) $(-\infty, 0) \cup (0, 9) \cup (9, \infty)$
- D) $(-\infty, \infty)$
- E) $(-\infty, -6) \cup (-6, 0) \cup (0, \infty)$

7. Find $(f \circ g)(x)$ where $f(x) = 3x - 5$ and $g(x) = \sqrt{x+9}$.

- A) $(3x-5)\sqrt{x+9}$
- B) $\sqrt{3x+27} - 5$
- C) $3\sqrt{x+4}$
- D) $\sqrt{3x+4}$
- E) $3\sqrt{x+9} - 5$

8. Find an expression for the area of the figure. Assume all angles are right angles.



- A) $125x$
 B) $187.5x^2$
 C) $125x^2$
 D) $70x$
 E) $187.5x$
9. Use the properties of logarithms to condense $7\log_{11} x - 5\log_{11} z$.
- A) $\log_{11} \frac{x^7}{z^5}$
 B) $\log_{11} x^5 - \log_{11} z^5$
 C) $\log_{11} (x - z)^2$
 D) $\log_{11} (7x - 5z)$
 E) $\log_{11} \frac{7x}{5z}$
10. Find the intercepts of $y = 7x - x^2$.
- A) x-intercepts: $(0, 0)$ and $\left(\frac{1}{7}, 0\right)$
 y-intercept: $(0, 0)$
 B) x-intercepts: $(-7, 0)$ and $(7, 0)$
 y-intercept: $(0, 0)$
 C) x-intercept: $(0, 0)$
 y-intercepts: $(0, 0)$ and $(7, 0)$
 D) x-intercepts: $(0, 0)$ and $(-7, 0)$
 y-intercept: $(0, 0)$
 E) x-intercepts: $(0, 0)$ and $(7, 0)$
 y-intercept: $(0, 0)$

11. Solve $|2x-1| \leq 7$, if possible. Write the answer in set notation.

A) $\{x | -4 \leq x \leq 3\}$

B) no solution

C) $\{x | -\frac{7}{2} \leq x \leq \frac{7}{2}\}$

D) $\{x | -3 \leq x \leq 4\}$

E) $\{x | -3 < x < 4\}$

12. Find the inverse function.

$$f(x) = 9 - 3x$$

A) $f^{-1}(x) = \frac{x-9}{3}$

B) $f^{-1}(x) = \frac{1}{3}x + 9$

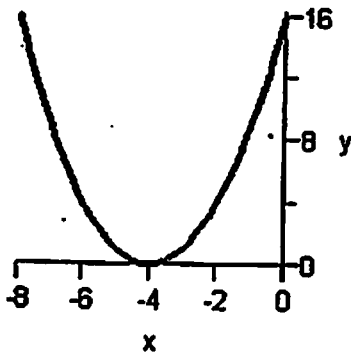
C) The function does not have an inverse.

D) $f^{-1}(x) = \frac{9-x}{3}$

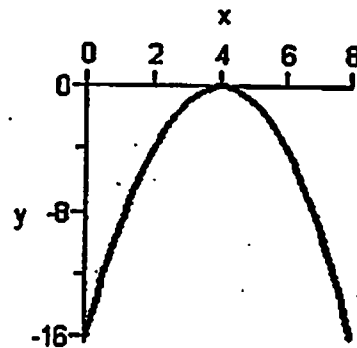
E) $f^{-1}(x) = -\frac{1}{3}x - 9$

13. Sketch the graph of $h(x) = -(x-4)^2$.

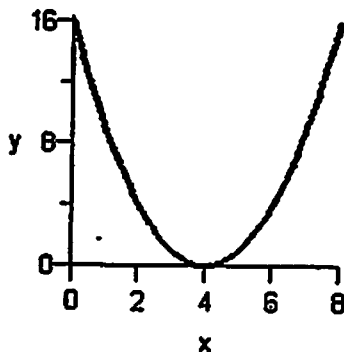
A)



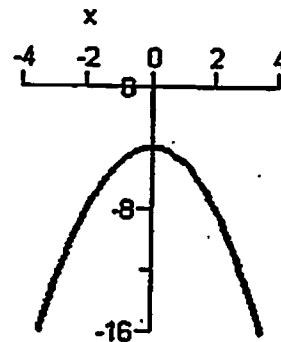
C)



B)



D)



14. Use synthetic division to divide.

$$\frac{x^3 + 3x^2 - 11}{x + 4}$$

A) $x^2 + x + 2 - \frac{17}{x + 4}$

B) $x^2 - x - \frac{7}{x + 4}$

C) $x^2 - x + 4 - \frac{27}{x + 4}$

D) $x^2 + 7x + 28 + \frac{123}{x + 4}$

E) $x^2 - x + 6 - \frac{12}{x + 4}$

15. Perform the division.

$$(x^2 + 9x + 20) \div (x + 5)$$

A) $x + 9 + \frac{5}{x + 5}, x \neq -5$

B) $x + 5, x \neq 5$

C) $x + 1 + \frac{16}{x + 5}, x \neq 5$

D) $x + 4, x \neq -5$

E) $x + \frac{20}{x + 5}, x \neq -5$

16. Simplify the expression.

$$\frac{(a-5)^{\frac{1}{7}}}{\sqrt[7]{a-5}}$$

A) $(a-5)^{\frac{2}{7}}$

B) $(a-5)^6$

C) $\frac{1}{(a-5)^{\frac{2}{7}}}$

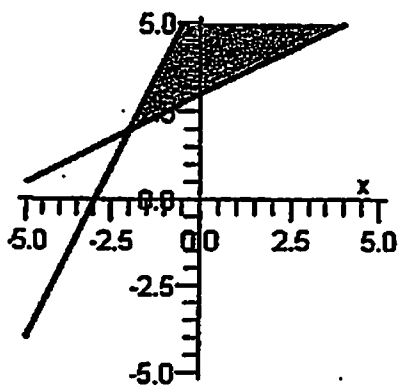
D) -1

E) 1

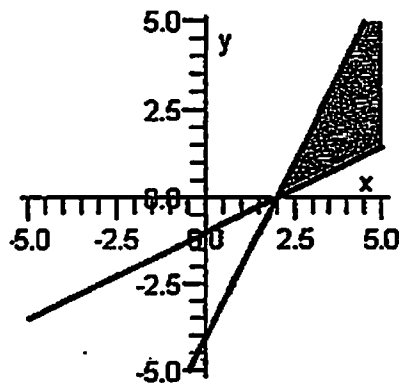
17. Graph the system of linear inequalities below.

$$\begin{cases} y \geq \frac{1}{2}x + 1 \\ y \leq 2x - 2 \end{cases}$$

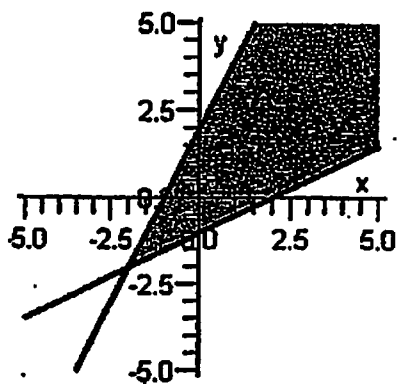
A)



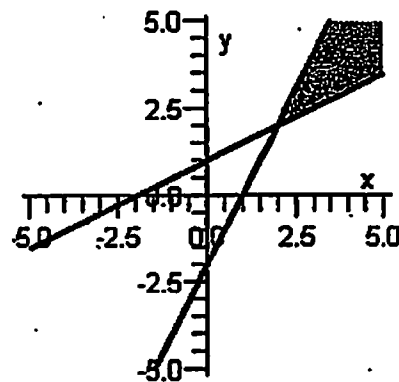
D)



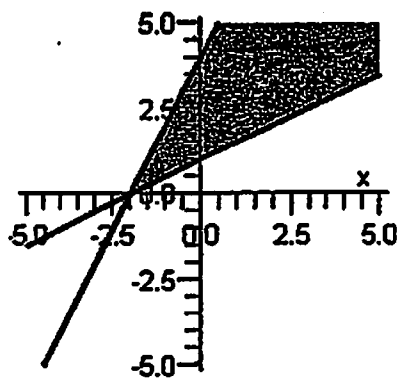
B)



E)



C)



18. Describe the domain of the function.

$$g(x) = \sqrt{8-3x}$$

A) $x \geq \frac{3}{8}$

B) $x \geq \frac{8}{3}$

C) $x \leq \frac{8}{3}$

D) all real numbers

E) $x \leq \frac{3}{8}$

19. Rewrite the expression using rational exponents.

$$\frac{\sqrt[3]{x^3}}{\sqrt[3]{x^{10}}}$$

A) $\frac{1}{x^{\frac{7}{3}}}$

B) $\frac{1}{x^7}$

C) x^7

D) x^3

E) $\frac{1}{x^3}$

20. Use the rules of exponents to simplify the expression below.

$$\left[\frac{(2x^3)(2x)^2}{(-2x)(2x)} \right]^3$$

A) $-128x^{13}$

B) $-8x^{13}$

C) $-64x^{15}$

D) $-x^9$

E) $-8x^9$

21. Identify the horizontal asymptote of $g(x) = 4^{x+5}$.

A) $y = 1024$

B) $y = \frac{1}{4}$

C) x -axis

D) $y = -5$

E) $y = 5$

22. A chemist wishes to mix a 30% acid solution with a 55% acid solution to obtain 120 quarts of a 40% acid solution. How many quarts of each solution should be mixed together?

A) 72 quarts of 30% solution
48 quarts of 55% solution

B) 66 quarts of 30% solution
54 quarts of 55% solution

C) 60 quarts of 30% solution
60 quarts of 55% solution

D) 36 quarts of 30% solution
84 quarts of 55% solution

E) 54 quarts of 30% solution
66 quarts of 55% solution

23. Expand $(x+5)^3$ and simplify.

A) $x^3 + 5x^2 + 25x + 125$

B) $x^3 - 75x^2 + 15x - 125$

C) $x^3 + 125$

D) $x^3 + 75x^2 + 15x + 125$

E) $x^3 + 15x^2 + 75x + 125$

24. The height h (in feet) of an object dropped from a tower 64 feet high is modeled by $h = 64 - 16t^2$, where t is the time in seconds. How long does it take for the object to reach the ground? Round your answer to two decimal places.

A) 2.00 seconds

B) 4.57 seconds

C) 0.50 seconds

D) 6.93 seconds

E) 4.00 seconds

25. Solve the system of linear equations below.

$$\begin{cases} 2x - 3y + 4z = 14 \\ 4x + y - 3z = -5 \\ 3x + 2y - 2z = -3 \end{cases}$$

A) $(0, 3, 1)$

B) $(0, 1, 3)$

C) $(3, 1, 0)$

D) $(3, 0, 1)$

E) $(1, 0, 3)$

26. Solve $x = \sqrt{44 - 7x}$, if possible.

A) no solution

B) $x = 4$

C) $x = 44$

D) $x = 7$

E) $x = -4$

27. Combine and simplify.

$$\frac{x+2}{x-1} - \frac{2}{x+10} - \frac{22}{x^2+9x-10}$$

A) $\frac{x(x-10)}{(x-1)(x+10)}, x \neq 10$

B) $\frac{x}{x-1}, x \neq -10$

C) $\frac{x+10}{x+9}, x \neq 10$

D) $\frac{x-22}{(x-1)(x+10)}, x \neq -10$

E) $\frac{x-1}{x+10}, x \neq -10$

28. Solve the equation. Check for extraneous solutions.

$$\frac{5}{x+10} + \frac{2}{x^2+2x-80} = \frac{-4}{x-8}$$

A) $x = \frac{2}{9}$

B) $x = -\frac{20}{9}$

C) $x = -2$

D) $x = 2$

E) $x = -\frac{2}{9}$

29. Write the quotient in standard form.

$$\frac{3i}{5+4i}$$

A) $-\frac{12}{41} + \frac{15}{41}i$

B) $\frac{15}{41} - \frac{12}{41}i$

C) $-\frac{15}{41} - \frac{12}{41}i$

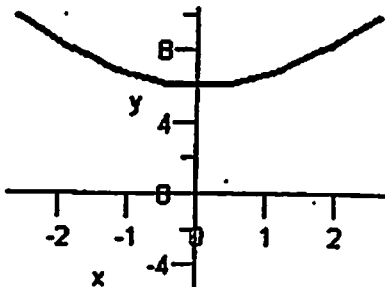
D) $\frac{12}{41} + \frac{15}{41}i$

E) none of the above

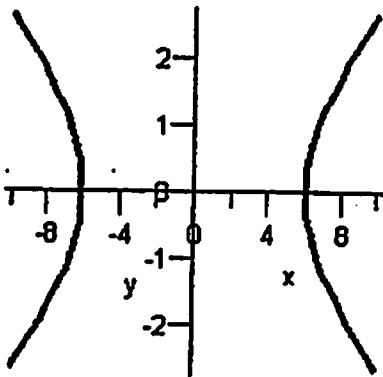
30. Graph the hyperbola.

$$\frac{x^2}{4} - \frac{y^2}{36} = 1$$

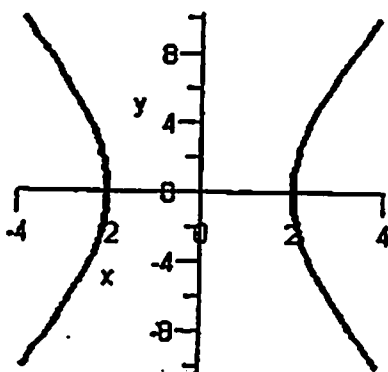
A)



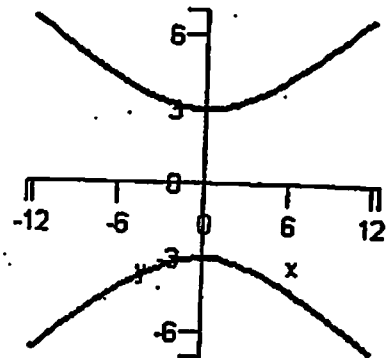
B)



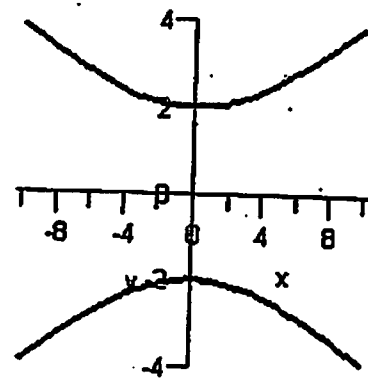
C)



D)



E)



31. Solve the equation of quadratic form.

$$x - \sqrt{x} - 30 = 0$$

A) $x = 5$; $x = -6$

B) $x = 36$

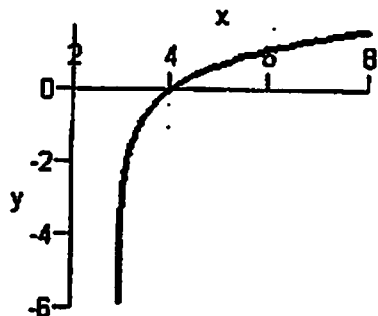
C) $x = \sqrt{5}i$; $x = \sqrt{6}$

D) $x = -25$; $x = 36$

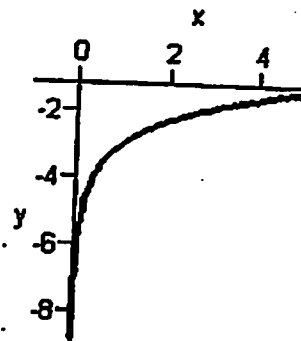
E) $x = -5$; $x = 6$

32. Graph the function $h(x) = \ln x - 3$.

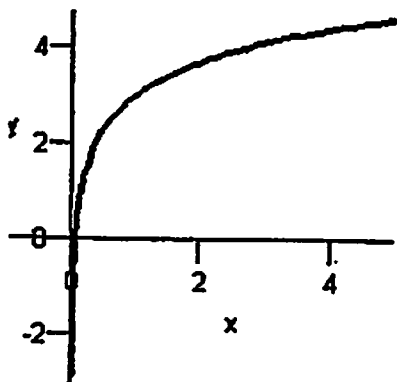
A)



D)

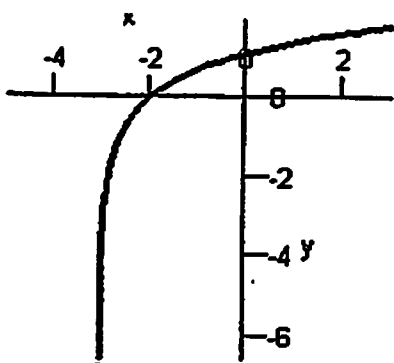


B)



E) none of these

C)

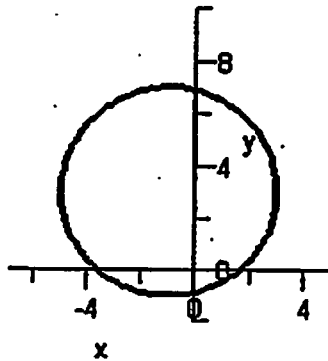


33. You and your college roommate travel to your respective hometowns in the same amount of time. You drive 200 miles and your friend drives 180 miles. Your friend's average speed is 6 miles per hour lower than your average speed. What is your average speed?

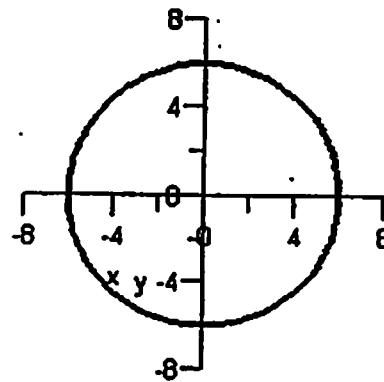
- A) 58 miles per hour
- B) 60 miles per hour
- C) 67 miles per hour
- D) 56 miles per hour
- E) 64 miles per hour

34. Graph the equation $(x+1)^2 + (y+4)^2 = 16$.

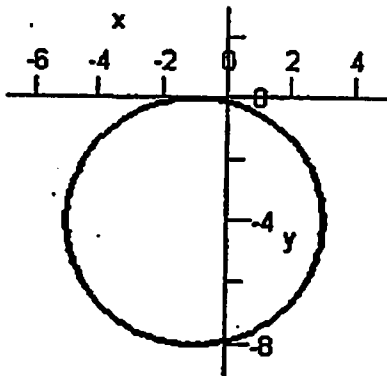
A)



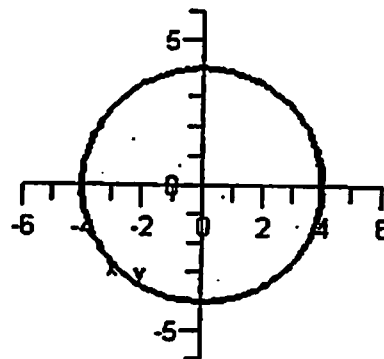
D)



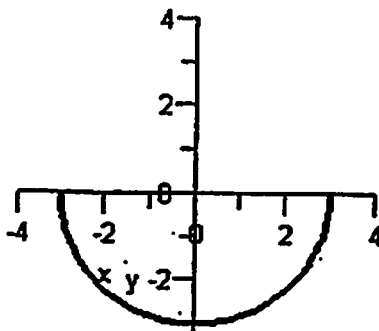
B)



E)



C)



35. Solve the system by the method of substitution.

$$\begin{cases} 25x^2 + 9y^2 = 225 \\ 5x + 3y = 15 \end{cases}$$

A) $(3, 0), (0, 5)$

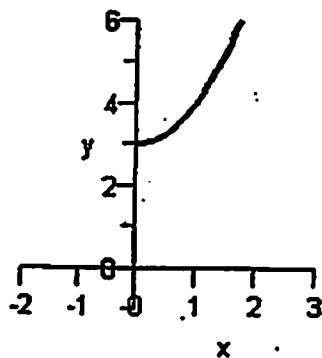
B) $(0, 0)$

C) no solution exists

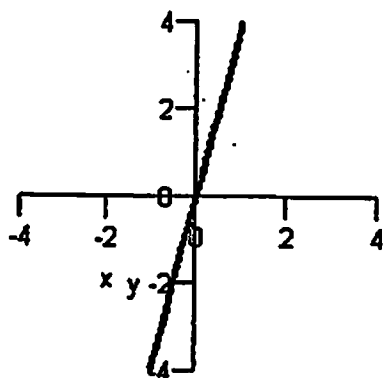
D) $(5, 3)$

E) $(5, 0), (0, 3)$

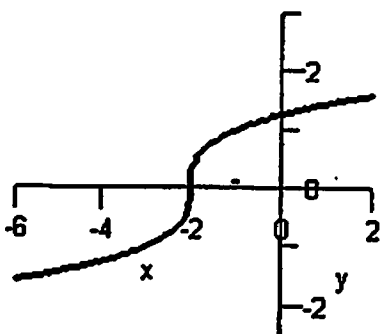
36. Match the graph with the graph of its inverse function.



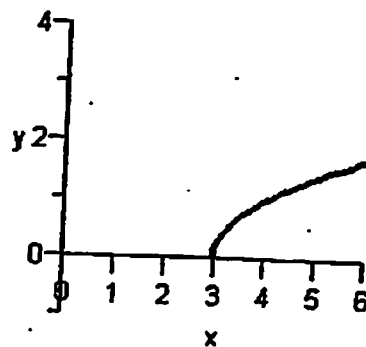
A)



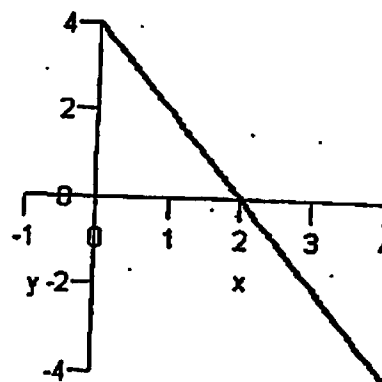
B)



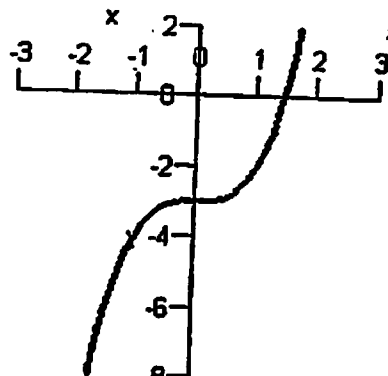
C)



D)



E)



37. Solve the equation. Do not use a calculator.

$$5^{x+3} = 25^5$$

A) $x = 1$

B) $x = 4$

C) $x = 7$

D) $x = 2$

E) none of these

38. Write an equation of the line that passes through the points (5, -8) and (4, 5). Write the equation in slope-intercept form.

A) $y = 13x - 73$

B) $y = -13x - 99$

C) $y = -\frac{1}{13}x + 57$

D) $y = \frac{1}{13}x - 73$

E) $y = -13x + 57$

39. Evaluate the determinant of the matrix. Expand by minors along the row or column that appears to make the computation easiest.

$$\begin{bmatrix} 1 & -2 & 0 \\ -2 & -2 & 2 \\ -1 & -3 & -4 \end{bmatrix}$$

A) 34

B) 2

C) 22

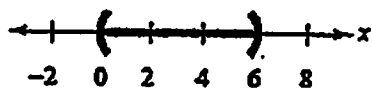
D) 26

E) 18

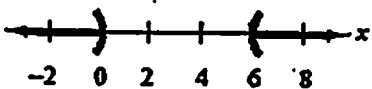
40. Graph the solution to the inequality on the real number line.

$$x^2 - 6x \geq 0$$

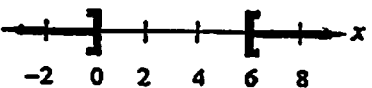
A)



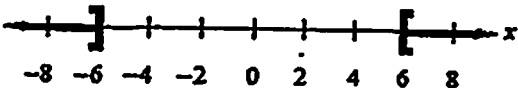
B)



C)



D)



E)

none of these