

There are 30 problems.

Problems #1–12 are Multiple Choice.

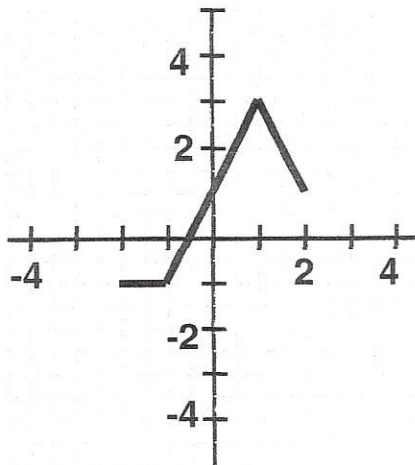
Problems #13–21 are Short Answer. (Work not required to be shown)

Problems #22–30 are Short Answer with work required to be shown.

MULTIPLE CHOICE

1. Determine the domain and range of the piecewise function.

1. _____



- A. Domain $[-2, 2]$; Range $[-1, 3]$
- B. Domain $[-1, 1]$; Range $[1, 3]$
- C. Domain $[-1, 3]$; Range $[-2, 2]$
- D. Domain $[-1/2, 2]$; Range $[0, 3]$

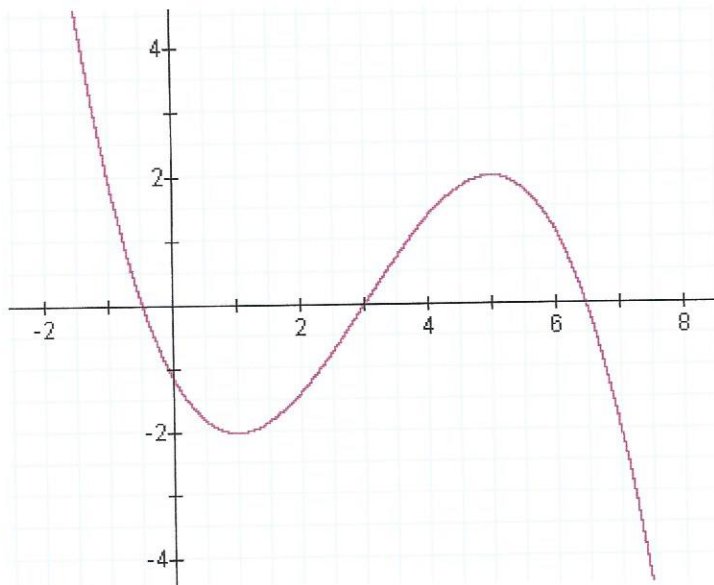
2. Solve: $\sqrt{15-2x} = 6-x$

2. _____

- A. 3
- B. 9
- C. 3, 7
- D. No solution

3. Determine the interval(s) on which the function is increasing.

3. _____



- A. $(-\infty, -0.5)$ and $(5, 6.5)$
- B. $(-0.5, 3)$
- C. $(1, 5)$
- D. $(-2, 2)$

4. Determine whether the graph of $y = 1 - x^2$ is symmetric with respect to the origin, the x -axis, or the y -axis.

4. _____

- A. not symmetric with respect to the x -axis, not symmetric with respect to the y -axis, and not symmetric with respect to the origin
- B. symmetric with respect to the x -axis only
- C. symmetric with respect to the y -axis only
- D. symmetric with respect to the origin only

5. Solve, and express the answer in interval notation: $|8 - 6x| \geq 2$.

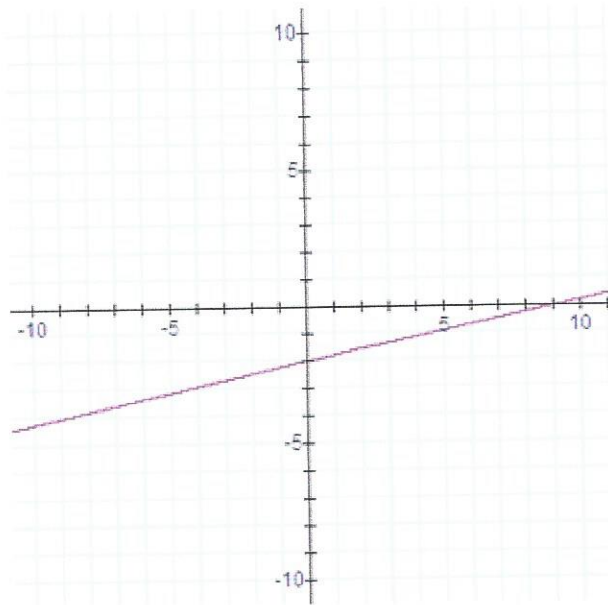
5. _____

- A. $(-\infty, 5/3] \cup [1, \infty)$
- B. $[1, \infty)$
- C. $(-\infty, 1] \cup [5/3, \infty)$
- D. $[1, 5/3]$

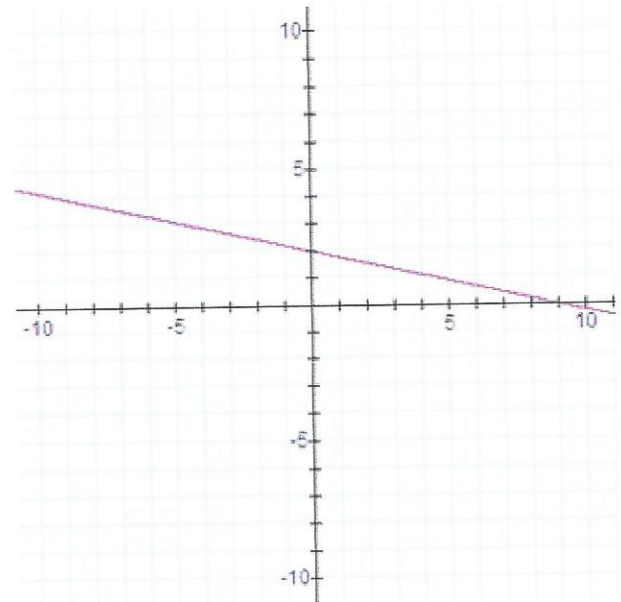
6. Which of the following represents the graph of $2x + 9y = 18$?

6. _____

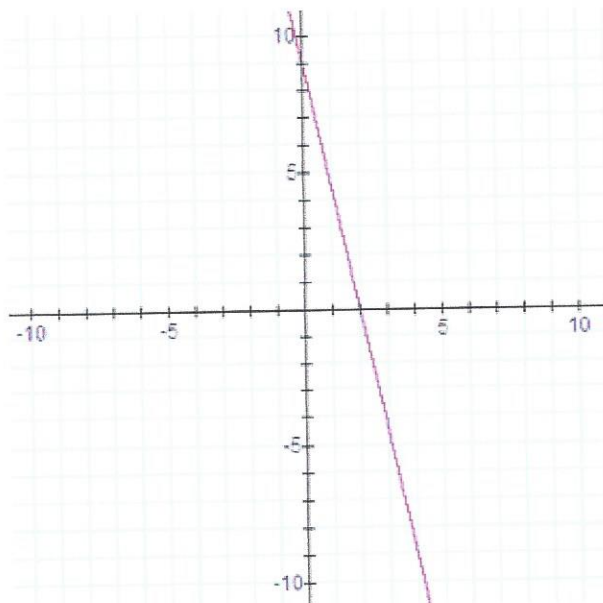
A.



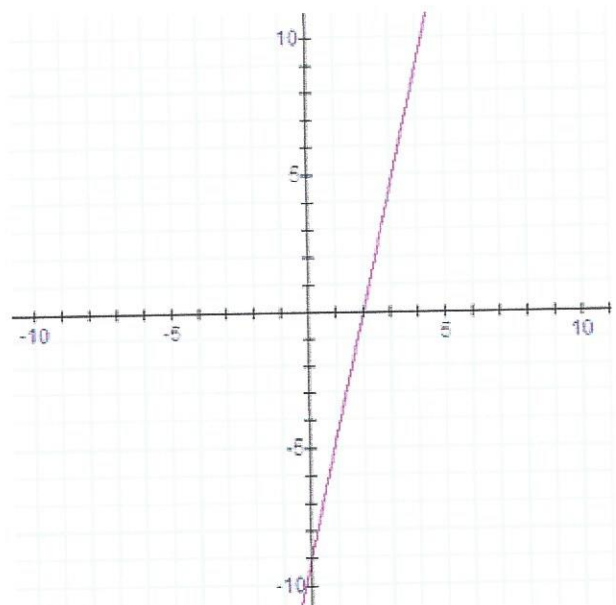
B.



C.



D.



7. Write a slope-intercept equation for a line parallel to the line $x - 8y = 3$ which passes through the point $(16, -5)$. 7. _____

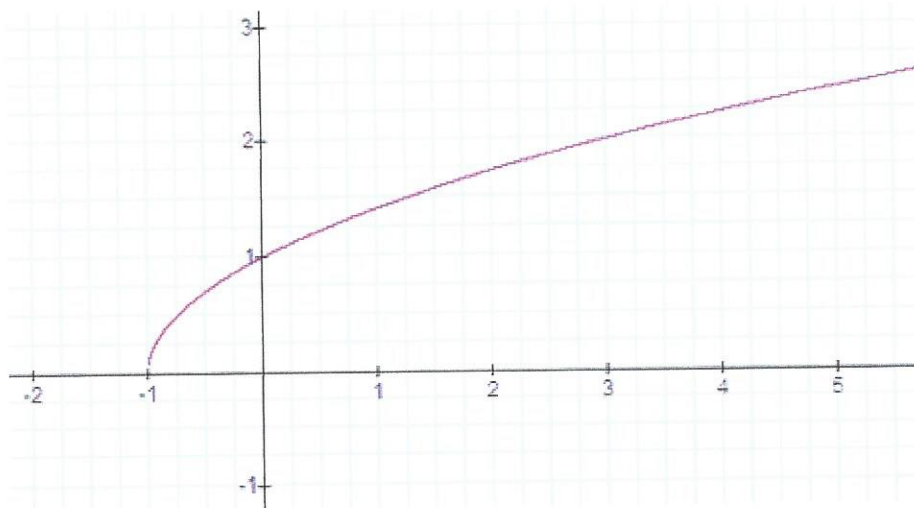
A. $y = \frac{1}{8}x - 5$

B. $y = \frac{1}{8}x - 7$

C. $y = -\frac{1}{8}x - 3$

D. $y = -8x + 123$

8. Does the graph below represent a function and is it one-to-one? 8. _____



- A. It is not a function but it is one-to-one.
B. It is not a function and it is not one-to-one.
C. It is a function and it is one-to-one.
D. It is a function but not one-to-one.

9. Express as a single logarithm: $\log(x-3) - 8 \log y + \log 1$

9. _____

A. $\frac{\log(x-3)}{\log(8y)}$

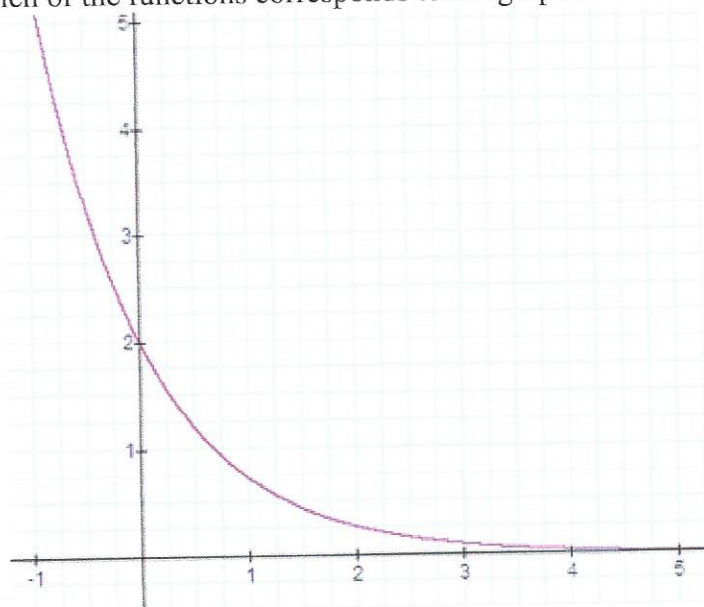
B. $\log\left(\frac{x-2}{8y}\right)$

C. $\log(x-2-8y)$

D. $\log\left(\frac{x-3}{y^8}\right)$

10. Which of the functions corresponds to the graph?

10. _____



A. $f(x) = 2 + e^{-x}$

B. $f(x) = 2 - e^x$

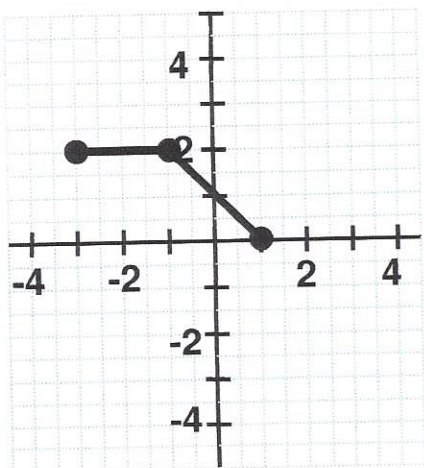
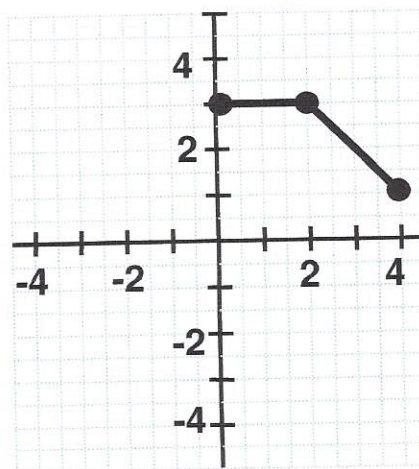
C. $f(x) = e^{-2x}$

D. $f(x) = 2e^{-x}$

11. The percentage score on a test varies directly as the number of correct responses. Will answered 44 questions correctly and earned a score of 55%. What would Will's percentage score have been if he had answered 68 questions correctly? 11. _____

- A. 88%
- B. 85%
- C. 79%
- D. 76%

12. The graph of $y = f(x)$ is shown at the left and the graph of $y = g(x)$ is shown at the right. (No formulas are given.) What is the relationship between $g(x)$ and $f(x)$? 12. _____

 $y = f(x)$  $y = g(x)$

- A. $g(x) = f(x - 1) + 3$
- B. $g(x) = f(x + 3) - 1$
- C. $g(x) = f(x + 1) - 3$
- D. $g(x) = f(x - 3) + 1$

SHORT ANSWER:13. Multiply and simplify: $(5 - 2i)(4 + 7i)$.Write the answer in the form $a + bi$, where a and b are real numbers.Answer: _____

14. Solve, and write the answer in interval notation: $\frac{x+6}{x+1} \geq 0$.Answer: _____

15. A can of soda at 78°F . is placed in a refrigerator that maintains a constant temperature of 35°F . The temperature T of the soda t minutes after it is placed in the refrigerator is given by

$$T(t) = 35 + 43e^{-0.058t}$$

Find the temperature of the soda 12 minutes after it is placed in the refrigerator. (Round to the nearest degree.)

Answer: _____

16. Find the value of the logarithm: $\log_4\left(\frac{1}{16}\right)$.Answer: _____

17. Solve: $5^{8x-5} = 25$.Answer: _____

18. Suppose \$4,400 is invested in an account at an annual interest rate of 4.5% compounded continuously. How long (to the nearest tenth of a year) will it take the investment to double in size?

Answer: _____

19. Let $f(x) = x^2 + 6x + 4$.

(a) Find the vertex.

Answer: _____

(b) State the range of the function.

Answer: _____

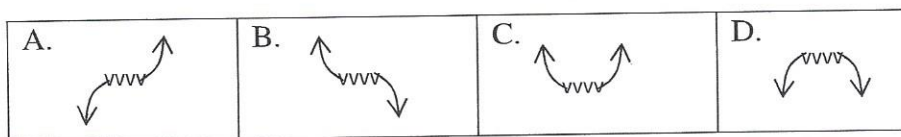
(c) On what interval is the function decreasing?

Answer: _____

20. Consider the polynomial $P(x)$, shown in both standard form and factored form.

$$P(x) = -\frac{1}{3}x^4 - \frac{1}{3}x^3 + \frac{7}{3}x^2 + \frac{1}{3}x - 2 = -\frac{1}{3}(x+3)(x+1)(x-1)(x-2)$$

(a) Which sketch illustrates the end behavior of the polynomial function?



Answer: _____

(b) State the zeros of the function.

Answer: _____

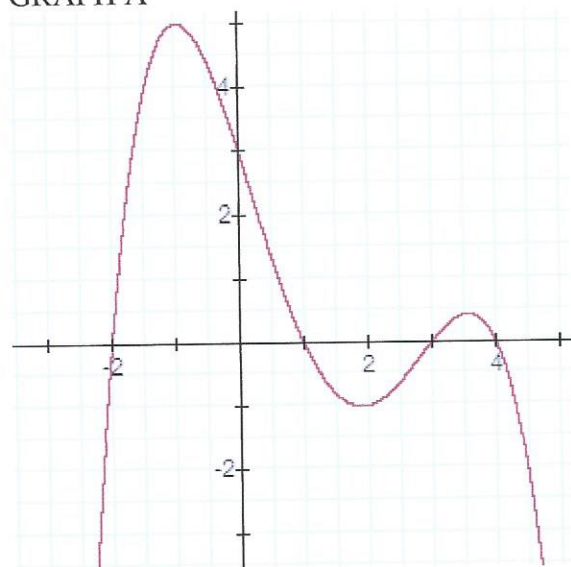
(c) State the y-intercept.

Answer: _____

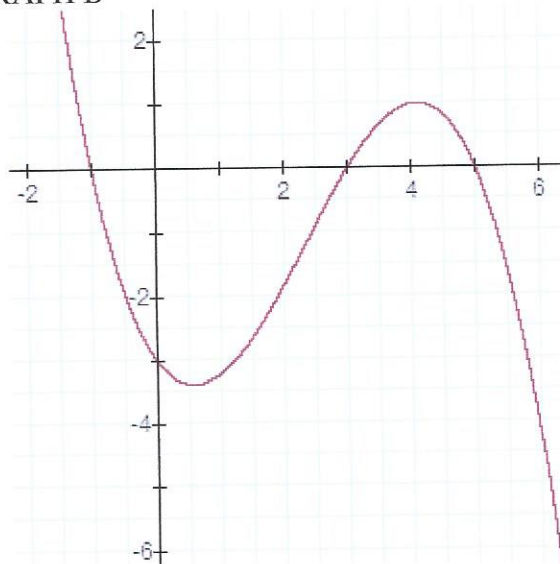
(d) State which graph below is the graph of $P(x)$.

Answer: _____

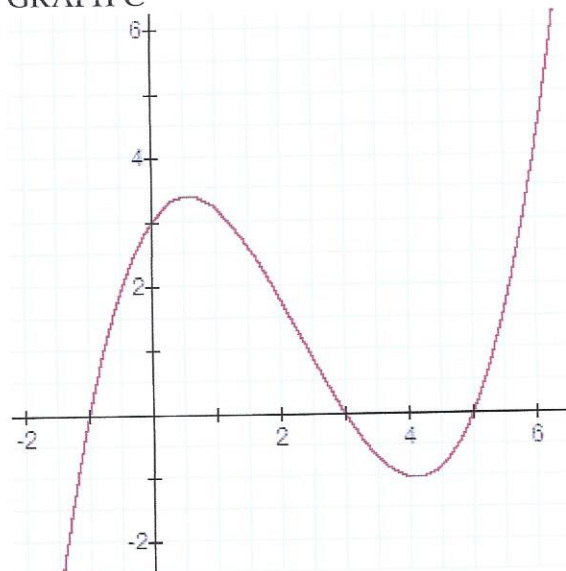
GRAPH A



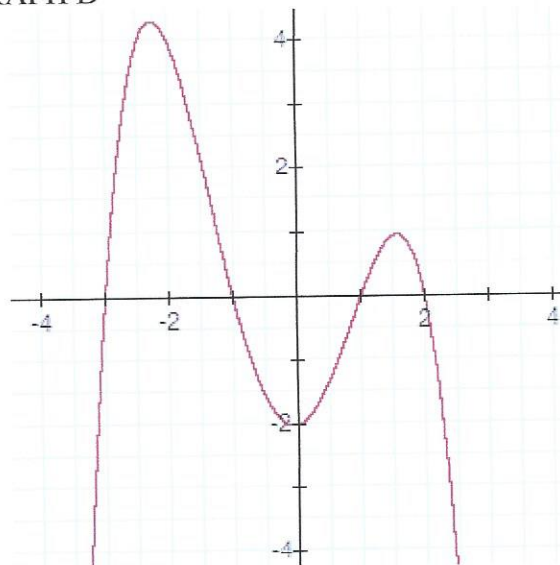
GRAPH B



GRAPH C



GRAPH D



21. Let $f(x) = \frac{2x^2 - 18}{x^2 - 25}$.

(a) State the domain.

Answer: _____

(b) State the horizontal asymptote.

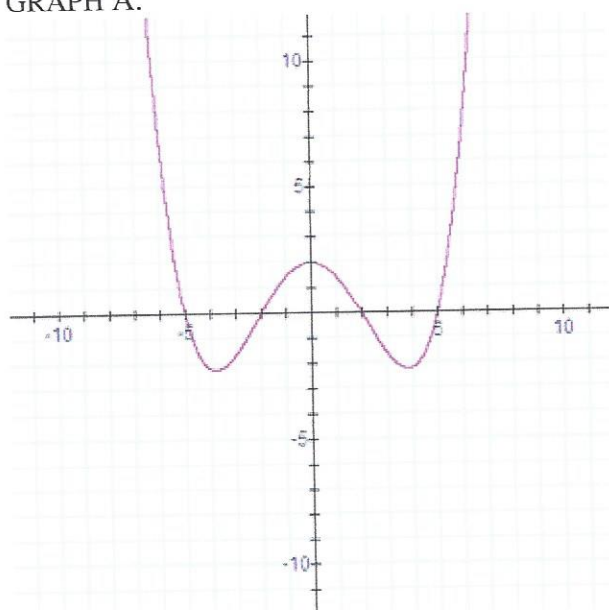
Answer: _____

(c) State the vertical asymptote(s).

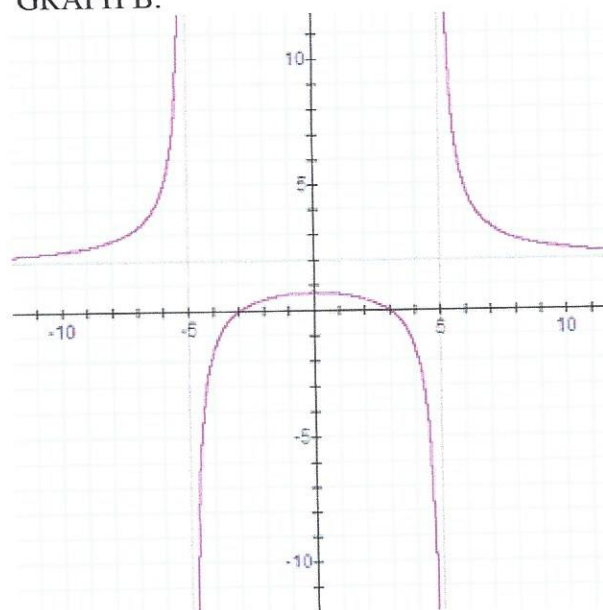
Answer: _____

(d) Which of the following represents the graph of $f(x) = \frac{2x^2 - 18}{x^2 - 25}$? Answer: _____

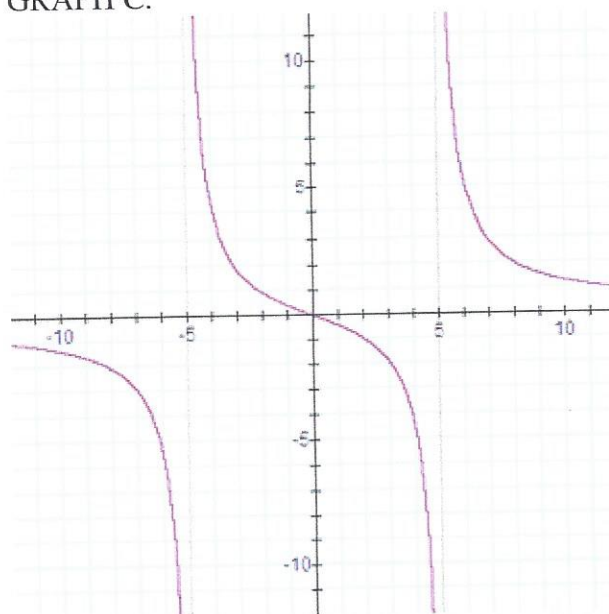
GRAPH A.



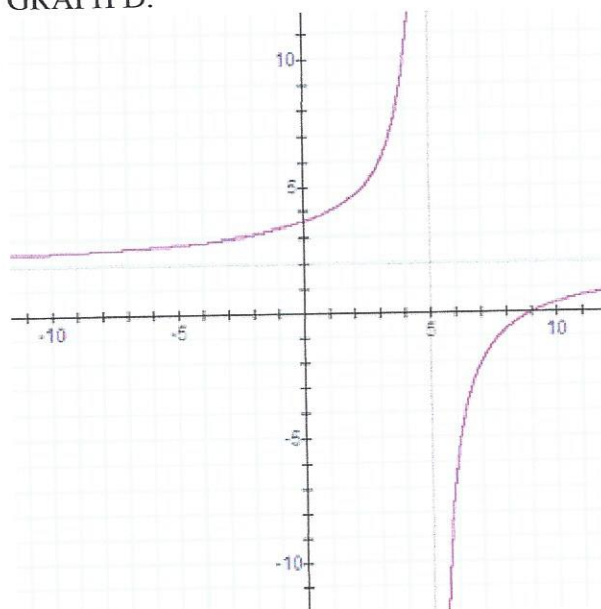
GRAPH B.



GRAPH C.



GRAPH D.



SHORT ANSWER, with work required to be shown, as indicated.

22. Simplify: $\frac{(-3ab^7)^3 a^{-4}b^2}{b^{-5}}$. **Show work.**

23. Points $(-5, 2)$ and $(3, 6)$ are endpoints of the diameter of a circle.

(a) What is the length of the diameter? Give the exact answer, simplified as much as possible.

Show work.

(b) What is the center of the circle?

(c) What is the equation of the circle?

24. Find the equation for a line which passes through the points $(-3, 9)$ and $(1, 5)$. Write the equation in slope-intercept form. **Show work.**

25. A salesperson earns a base salary of \$1,700 per month and a commission of 8% on the amount of sales made. If the salesperson has a paycheck of \$4,388 for one month, what was the amount of sales for the month? **Show work.**

26. Let $f(x) = 2x^2 - 9$ and $g(x) = x - 5$.

(a) Find the composite function $(f \circ g)(x)$ and simplify. **Show work.**

(b) Find $(f \circ g)(-1)$. **Show work.**

27. Find the exact solutions and simplify as much as possible: $32x^2 + 1 = 8x$. **Show work.**

28. Given the function $f(x) = 2 - \frac{1}{7}x$, find a formula for the inverse function. **Show work.**

29. Donut Delights, Inc. has determined that when x donuts are made daily, the profit P is given by

$$P(x) = -0.001x^2 + 2.9x - 1000$$

(a) What is the company's profit if 900 donuts are made daily?

(b) How many donuts should be made daily in order to maximize the company's profit? **Show work.**

30. Solve: $\frac{x-10}{x-7} + \frac{42}{x^2-49} = 0$. **Show work.**
