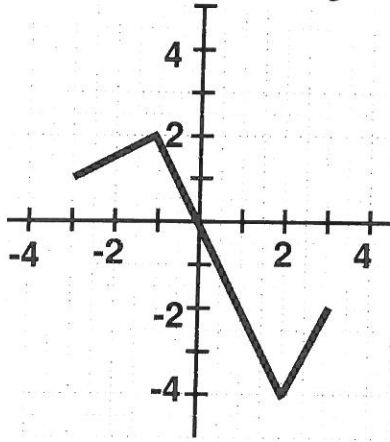


**MULTIPLE CHOICE**

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

1. \_\_\_\_\_



- A. Domain  $[-4, 2]$ ; Range  $[2, 3]$
- B. Domain  $[-4, 2]$ ; Range  $[-3, 3]$
- C. Domain  $[-3, 3]$ ; Range  $[-4, 2]$
- D. Domain  $[-1, 2]$ ; Range  $[2, 4]$

2. Solve:  $\sqrt{6x+16} = -x$

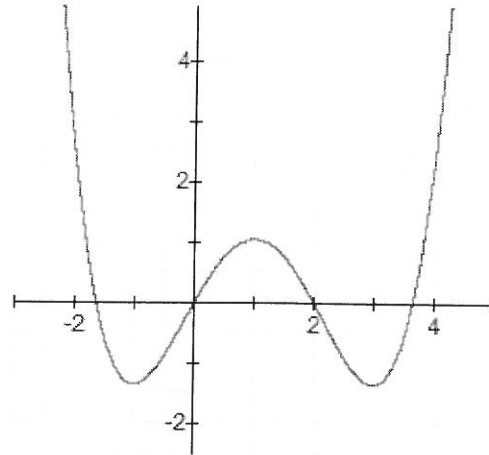
2. \_\_\_\_\_

- A.  $-2$
- B.  $-16/7$
- C.  $-2, 8$
- D. No solution

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

3. \_\_\_\_\_

- A.  $(-\infty, -1)$  and  $(1, 3)$
- B.  $(-5/3, 0)$  and  $(2, 11/3)$
- C.  $(-1, 1)$  and  $(3, \infty)$
- D.  $(-4/3, 1)$



4. Determine whether the graph of  $y = 5 + |x|$  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 origin only
- C. symmetric with respect to the  $x$ -axis only
- D. symmetric with respect to the  $y$ -axis only

5. Solve, and express the answer in interval notation:  $|7 - 5x| \leq 8$ .

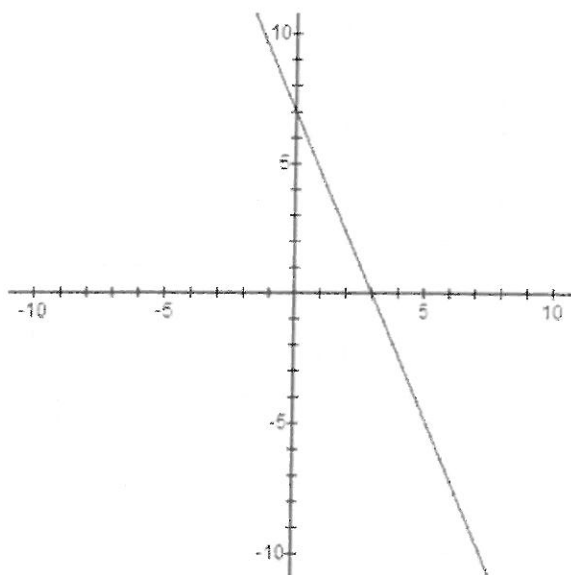
5. \_\_\_\_\_

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

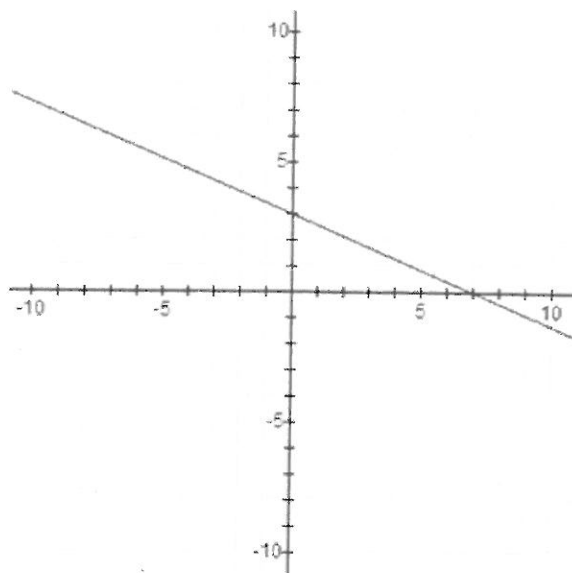
6. Which of the following represents the graph of  $3x + 7y = 21$  ?

6. \_\_\_\_\_

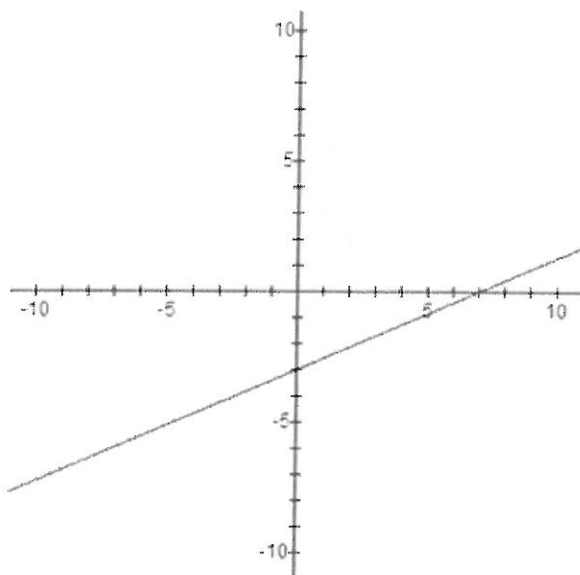
A.



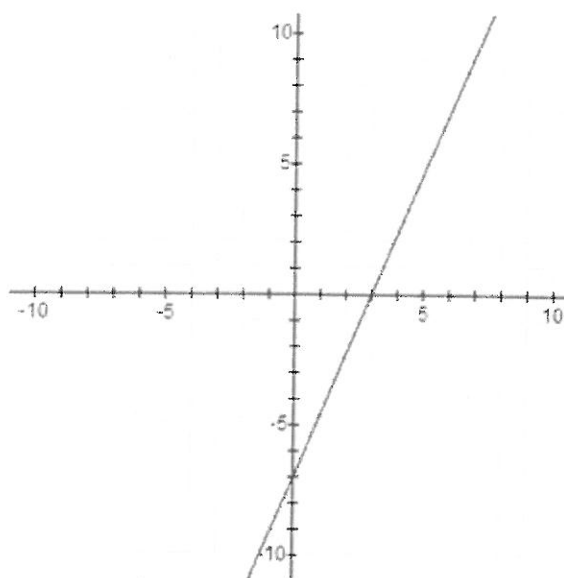
B.



C.



D.



7. Write a slope-intercept equation for a line parallel to the line  $x - 3y = 8$  which passes through the point  $(-12, 7)$ . 7. \_\_\_\_\_

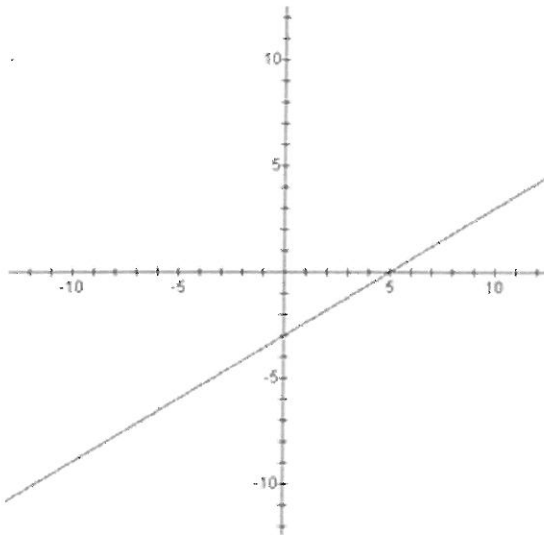
A.  $y = -\frac{1}{3}x + 3$

B.  $y = -3x - 29$

C.  $y = \frac{1}{3}x + 11$

D.  $y = \frac{1}{3}x + 7$

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



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

9. Express as a single logarithm:  $5 \log y + \log 1 - \log(x - 7)$

9. \_\_\_\_\_

A.  $\frac{\log(5y)}{\log(x-7)}$

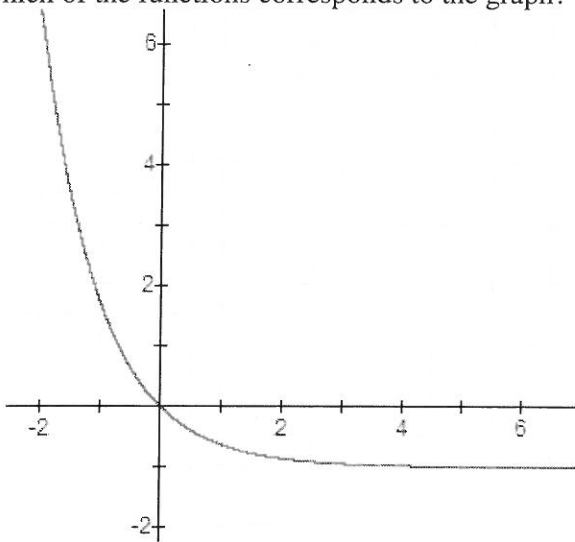
B.  $\log\left(\frac{y^5}{x-7}\right)$

C.  $\log\left(\frac{5y+1}{x-7}\right)$

D.  $\log(5y+6-x)$

10. Which of the functions corresponds to the graph?

10. \_\_\_\_\_



A.  $f(x) = -e^x$

B.  $f(x) = e^{-x} + 1$

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

D.  $f(x) = e^{-x} - 1$

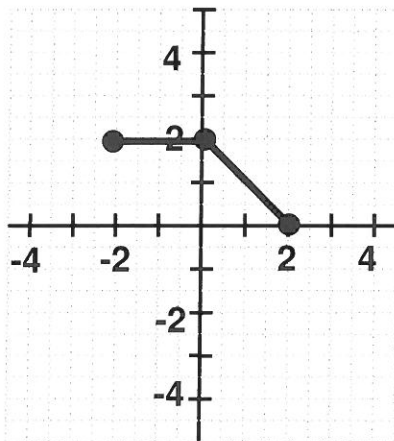
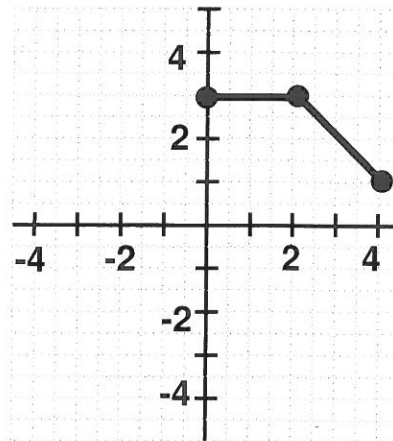
11. A candidate's share of the votes varies directly as the number of votes cast for the candidate. In a city council election with four candidates, Vance received 1,026 votes and earned a 38% share of the votes. Wilson received 1,215 votes. What was Wilson's corresponding share of the votes?

11. \_\_\_\_\_

- A. 57%
- B. 62%
- C. 45%
- D. 52%

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.  $g(x) = f(x + 1) - 2$
- B.  $g(x) = f(x - 1) + 2$
- C.  $g(x) = f(x - 2) + 1$
- D.  $g(x) = f(x + 2) + 1$

**SHORT ANSWER:**

13. Multiply and simplify:  $(9 + 7i)(8 + 3i)$ .

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:  $\frac{x+2}{x-9} \leq 0$ . Answer: \_\_\_\_\_

---

15. A bowl of soup at  $200^\circ$  F. is placed in a room of constant temperature of  $60^\circ$  F. The temperature  $T$  of the soup  $t$  minutes after it is placed in the room is given by

$$T(t) = 60 + 140 e^{-0.075 t}$$

Find the temperature of the soup 20 minutes after it is placed in the room. (Round to the nearest degree.)

Answer: \_\_\_\_\_

---

16. Find the value of the logarithm:  $\log_2\left(\frac{1}{16}\right)$ . Answer: \_\_\_\_\_

---

17. Solve:  $9^{6x-5} = 81$ . Answer: \_\_\_\_\_

---

18. Suppose \$5,600 is invested in an account at an annual interest rate of 7.1% compounded continuously. How long (to the nearest tenth of a year) will it take the investment to double in size?

Answer: \_\_\_\_\_

---

19. Let  $f(x) = x^2 + 12x + 46$ .

(a) Find the vertex. Answer: \_\_\_\_\_

(b) State the range of the function. Answer: \_\_\_\_\_

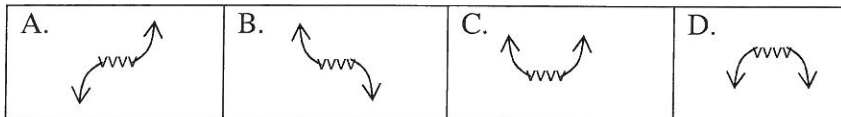
(c) On what interval is the function increasing? Answer: \_\_\_\_\_

---

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

$$P(x) = \frac{1}{5}x^3 - \frac{3}{5}x^2 - \frac{13}{5}x + 3 = \frac{1}{5}(x+3)(x-1)(x-5)$$

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



Answer: \_\_\_\_\_

(b) State the zeros of the function.

Answer: \_\_\_\_\_

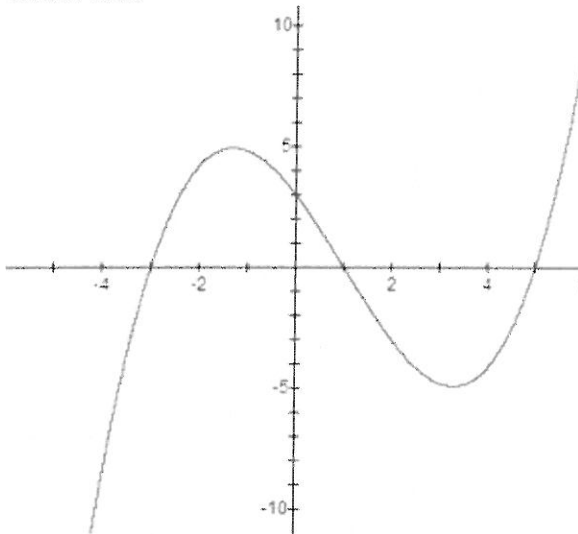
(c) State the y-intercept.

Answer: \_\_\_\_\_

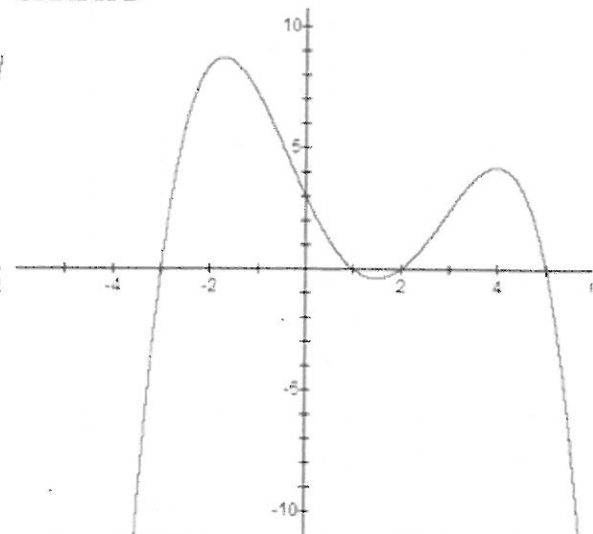
(d) State which graph below is the graph of  $P(x)$ .

Answer: \_\_\_\_\_

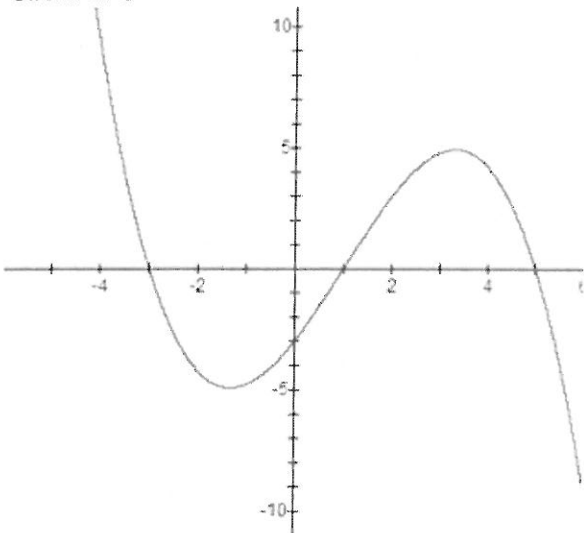
GRAPH A



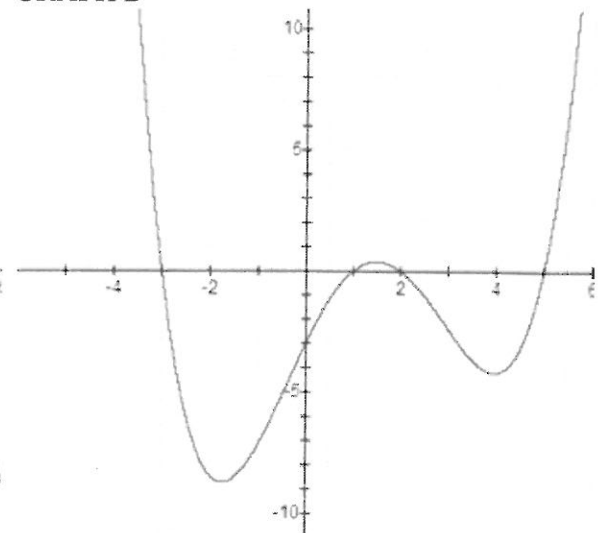
GRAPH B



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.

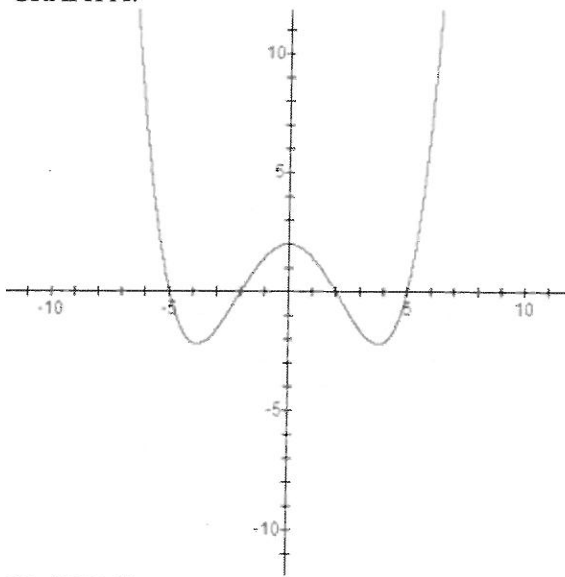
Answer: \_\_\_\_\_

(c) State the vertical asymptote(s).

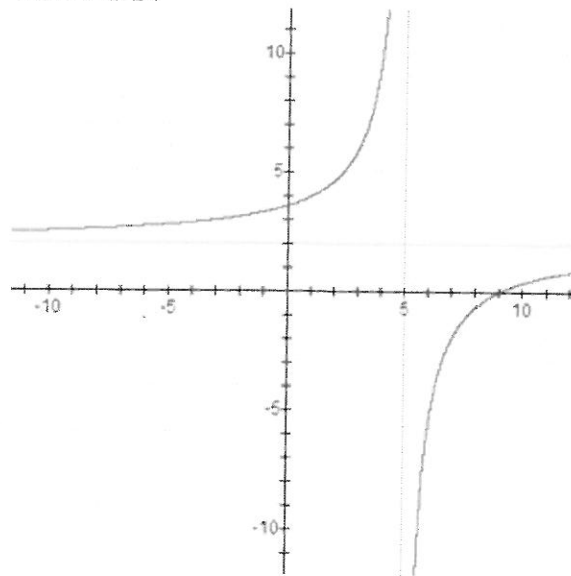
Answer: \_\_\_\_\_

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

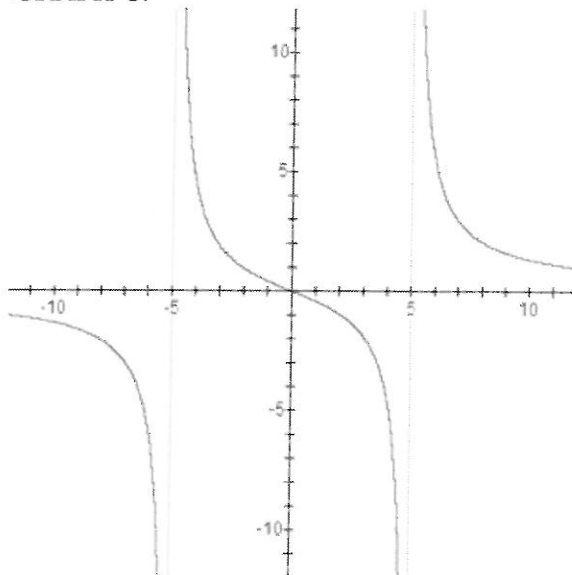
GRAPH A.



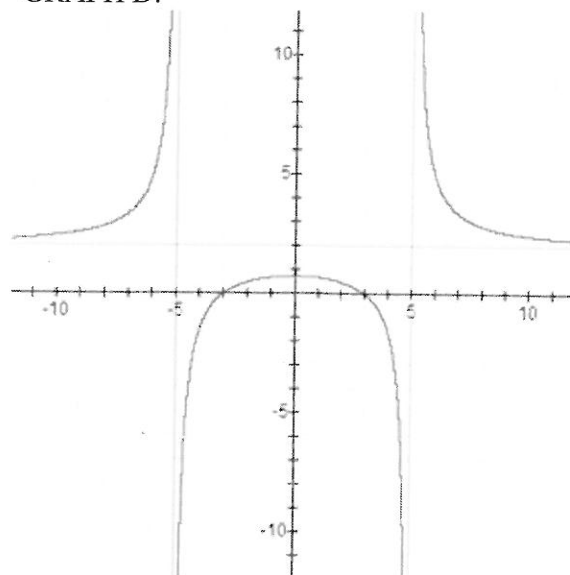
GRAPH B.



GRAPH C.



GRAPH D.



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

22. Simplify:  $\frac{(-5a^2b^3)^4 a^5 b^{-12}}{a^{-7}}$ . **Show work.**

---

23. Points  $(-1, 6)$  and  $(1, 8)$  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  $(-5, 1)$  and  $(-7, 5)$ . Write the equation in slope-intercept form. **Show work.**

---

25. A salesperson earns a base salary of \$1,480 per month and a commission of 7.2% on the amount of sales made. If the salesperson has a paycheck of \$4,259.20 for one month, what was the amount of sales for the month? **Show work.**

---

26. Let  $f(x) = 7x^2 - 9$  and  $g(x) = x - 3$ .

(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:  $2x^2 + 49 = 14x$ . **Show work.**

---

28. Given the function  $f(x) = 7 + \frac{1}{2}x$ , 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

$$P(x) = -0.002x^2 + 3.8x - 70$$

(a) What is the company's profit if 400 donuts are made daily?

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

---

30. Solve:  $\frac{x-3}{x+2} = \frac{20}{x^2-4}$ . **Show work.**

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