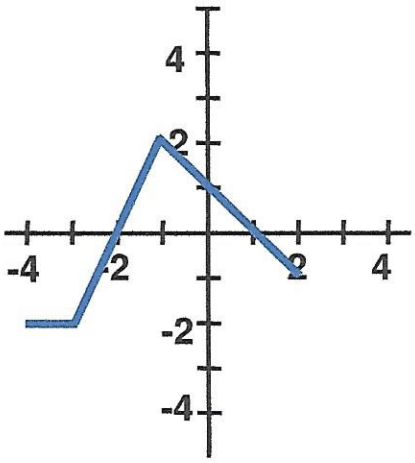
1. Determine the domain and range of the piecewise function. 1. _____



A. Domain [–2, 2]; Range [–4, 2]
B. Domain [–2, 1]; Range [0, 2]
C. Domain [–4, 2]; Range [–2, 2]
D. Domain (–∞, 2]; Range (–∞, 2]

2. Solve: $\sqrt{6x+27} = -x$ 2. _____

A. No solution
B. –27/7
C. –3, 9
D. –3

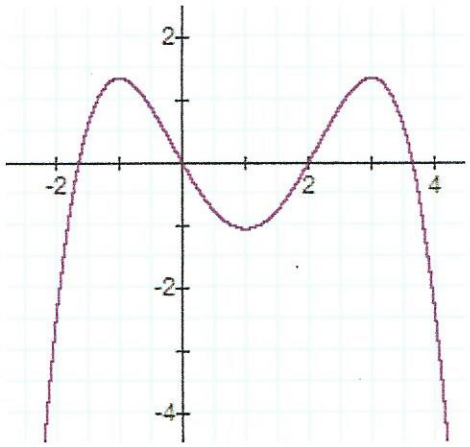
3. Determine the interval(s) on which the function is decreasing. 3. _____

A. $(-1,1)$ and $(3,\infty)$

B. $(-\infty,0)$ and $(2,\infty)$

C. $(-\infty,-5/3)$, $(0,2)$, and $(11/3,\infty)$

D. $(-\infty,\ 4/3)$



4. Determine whether the graph of $y=|x|-3$ 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: $|7-4x| \le 13$. 5. _____

A. $(-\infty, -3/2]$

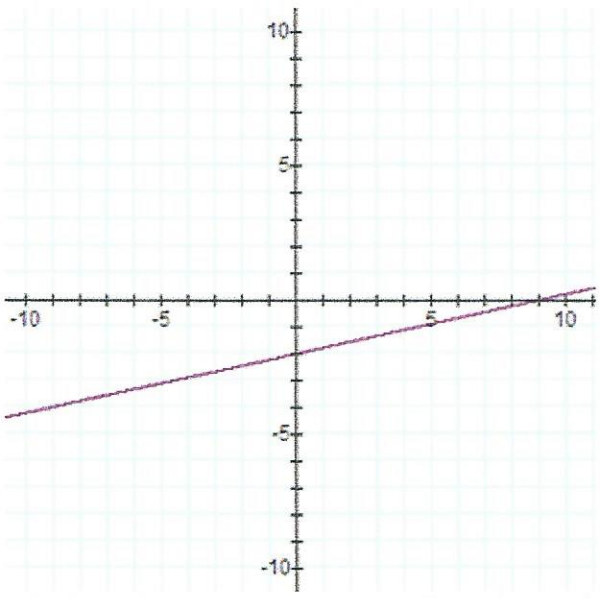
B. $(-\infty, -3/2] \cup [5, \infty)$

C. $[-3/2, 5]$

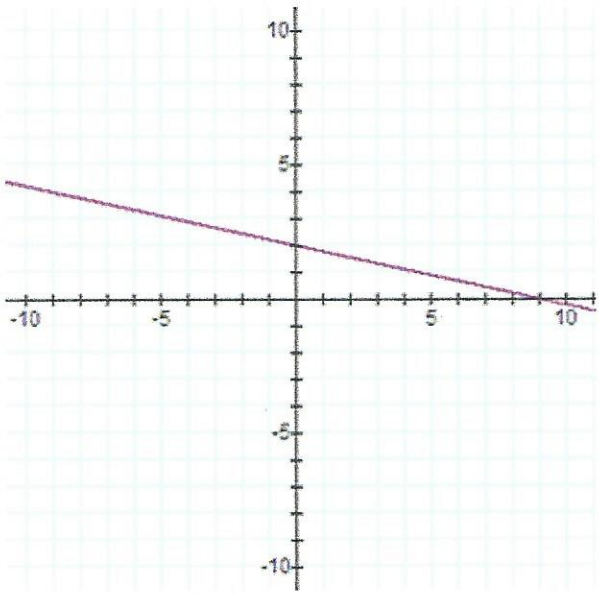
D. $(-\infty, 5] \cup [-3/2, \infty)$

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

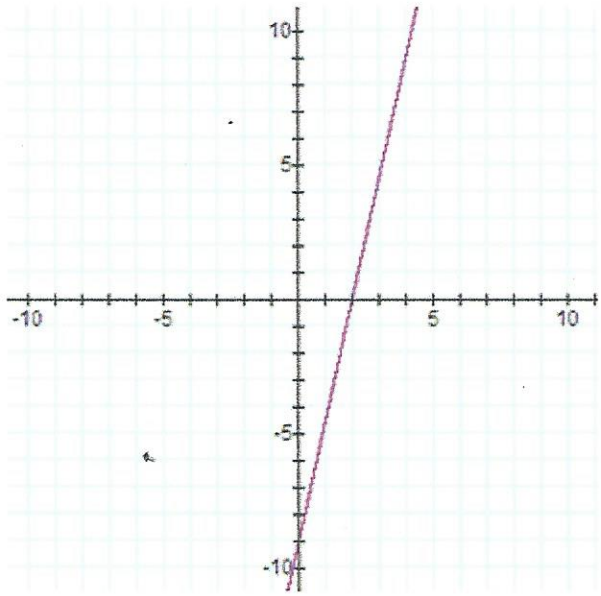
A.



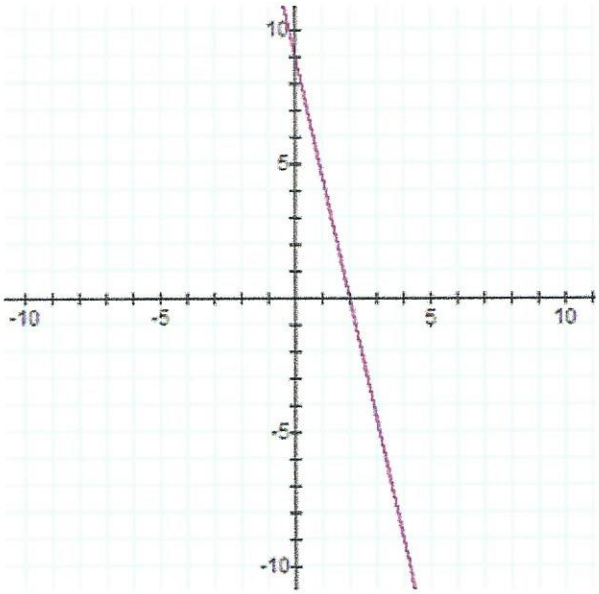
B.



C.



D.



7. Write a slope-intercept equation for a line parallel to the line $x - 2y = 8$ which passes through the point (–5, 2). 7. _____

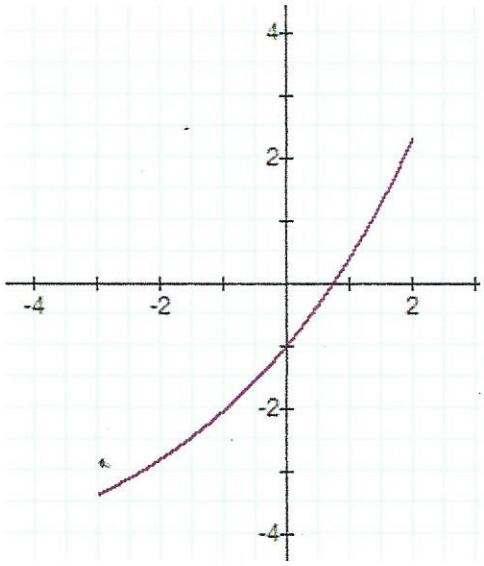
A. $y = \frac{1}{2}x + 2$

B. $y = \frac{1}{2}x + \frac{9}{2}$

C. $y = -\frac{1}{2}x + 2$

D. $y = -\frac{1}{2}x - \frac{1}{2}$

8. Which of the following best describes the graph? 8. _____



A. It is the graph of a function and it is one-to-one.
B. It is the graph of a function but not one-to-one.
C. It is the graph of an absolute value relation.
D. It is not the graph of a function.

9. Express in an equivalent form: $\log(x+3) + \log 1 - 2\log y$ 9. _____

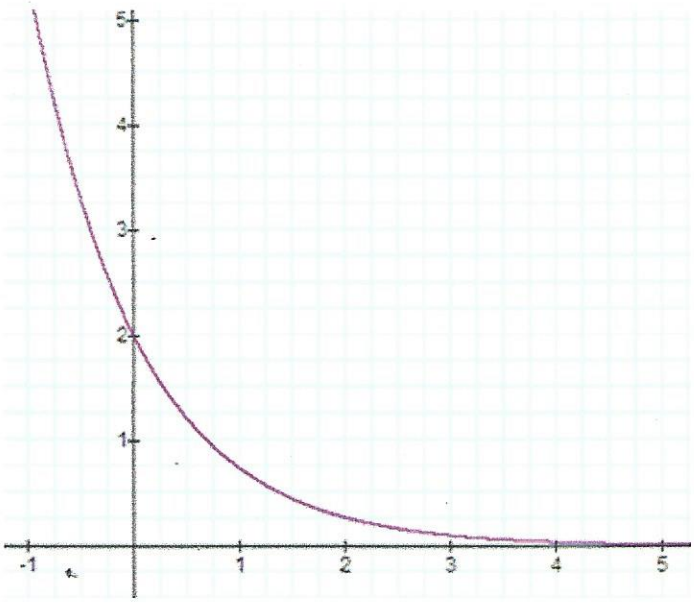
A. $\dfrac{\log(x+3)}{\log(y^2)}$

B. $\log(x+4-2y)$

C. $\log\left(\dfrac{x+4}{2y}\right)$

D. $\log\left(\dfrac{x+3}{y^2}\right)$

10. Which of the functions corresponds to the graph? 10. _____



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

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

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

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

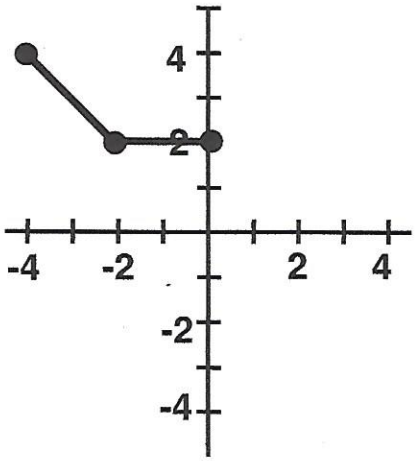
11. A candidate's share of the votes varies directly as the number of votes cast for the candidate. In a city council election with four candidates, Lance received 1,026 votes and earned a 38% share of the votes. Milton received 1,215 votes. What was Milton's corresponding share of the votes?

11. _____

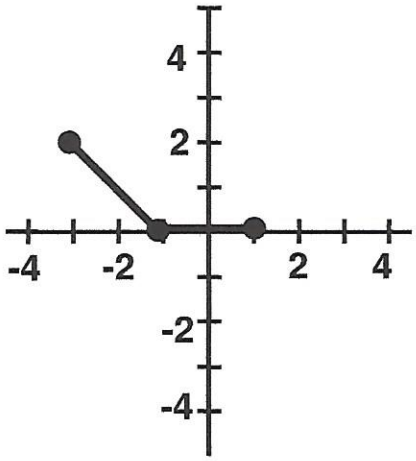
A. 62%
B. 57%
C. 52%
D. 45%

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

SHORT ANSWER:

13. Multiply and simplify: $(9 - i)(4 + 3i)$.
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: $\frac{x-2}{x-5} \geq 0$. Answer: _____

---

15. A can of soda at 78° F. is placed in a refrigerator that maintains a constant temperature of 38° F. The temperature T of the soda t minutes after it is placed in the refrigerator is given by

$$T(t) = 38 + 40\, e^{-0.058\, t}$$

Find the temperature of the soda 10 minutes after it is placed in the refrigerator. (Round to the nearest tenth of a degree.)

Answer: _____

---

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

---

17. Solve: $9^{8x-3} = 81$. Answer: _____

---

18. Suppose $2,200 is invested in an account at an annual interest rate of 5.7% compounded continuously. How long (to the nearest tenth of a year) will it take the investment to double in size? Answer: _____

---

19. Let $f(x) = x^2 - 12x + 44$.

(a) Find the vertex. Answer: _____

(b) State the range of the function. Answer: _____

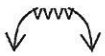
(c) On what interval is the function decreasing? Answer: _____

---

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?

A.	B.	C.	D.
			

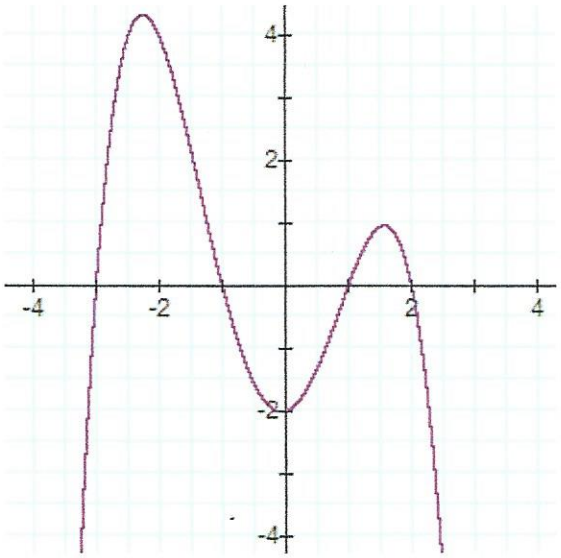
Answer: _____

(b) State the y-intercept. Answer: _____

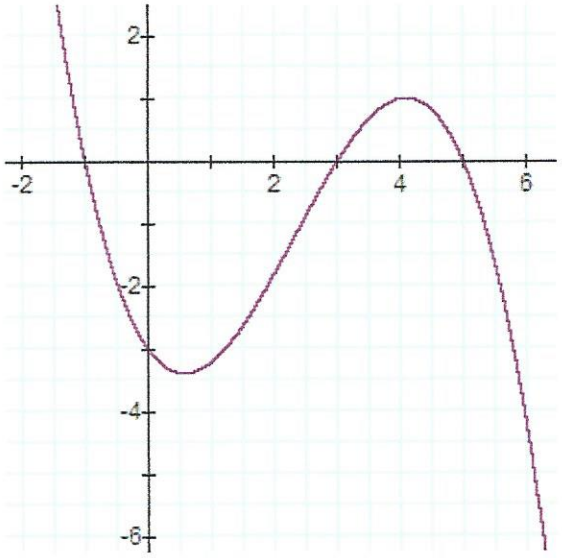
(c) State the zeros of the function. Answer: _____

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

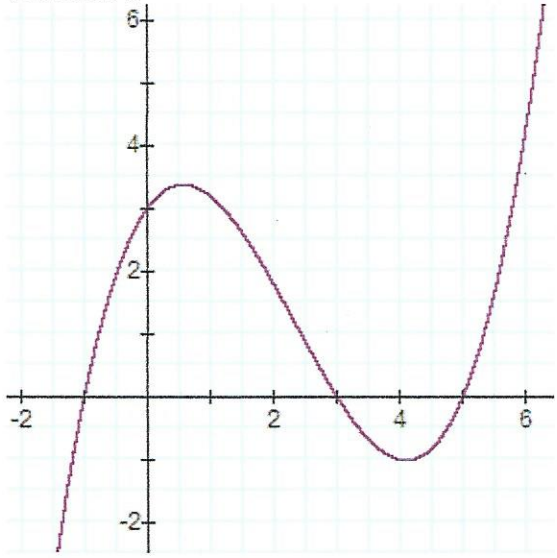
GRAPH A



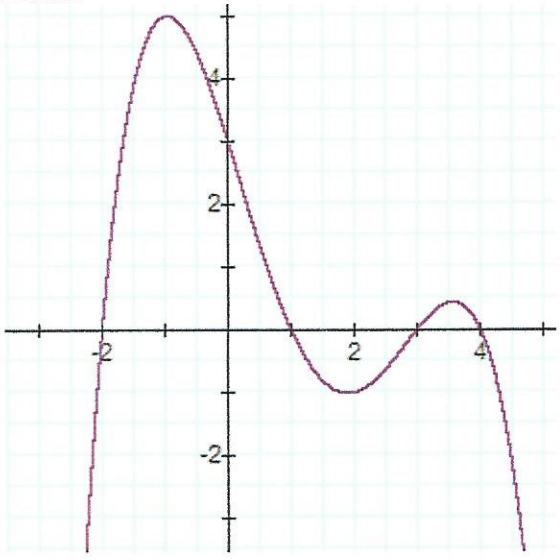
GRAPH B



GRAPH C



GRAPH D



21. Let $f(x)=\dfrac{2+x}{3-x}$.

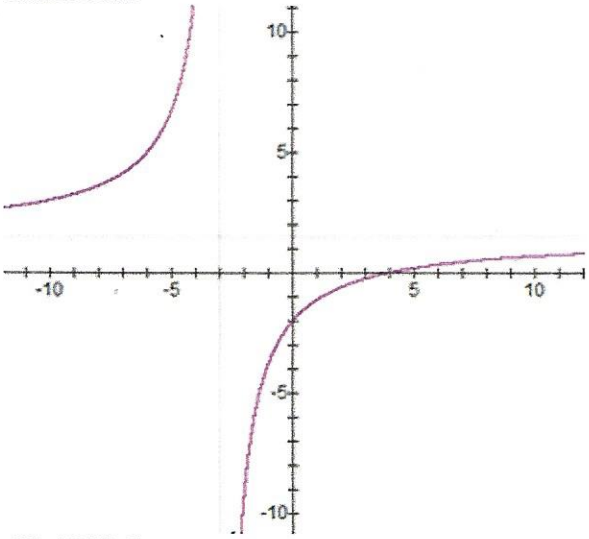
(a) State the domain. Answer: _____

(b) State the horizontal asymptote. Answer: _____

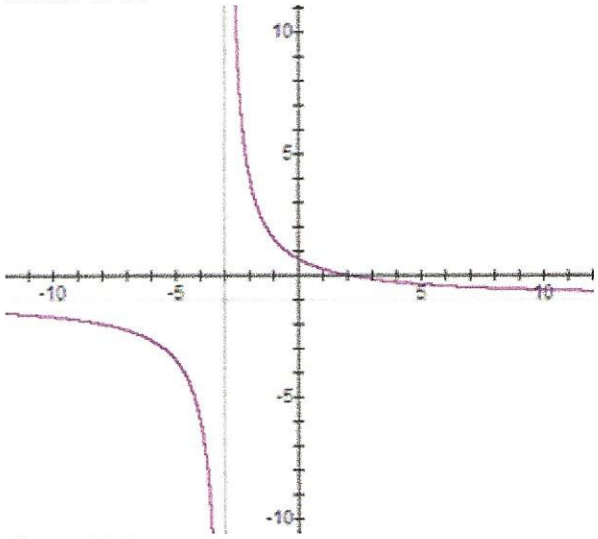
(c) State the vertical asymptote(s). Answer: _____

(d) Which of the following represents the graph of $f(x)=\dfrac{2+x}{3-x}$? Answer: _____

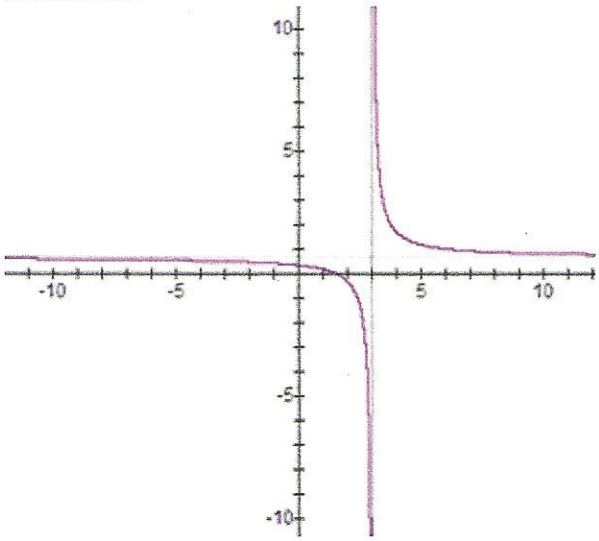
GRAPH A.



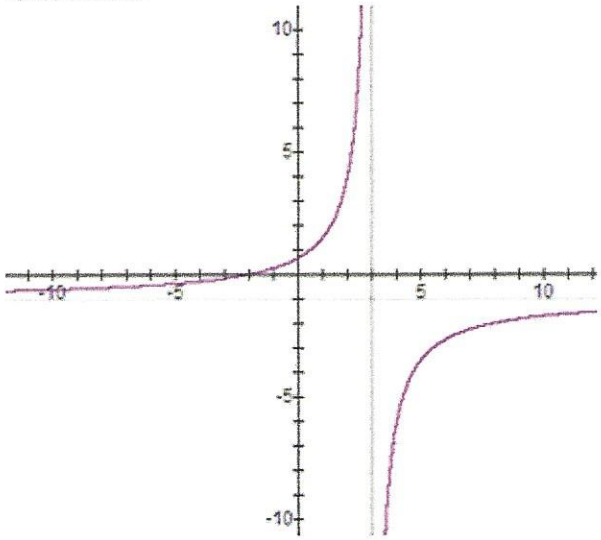
GRAPH B.



GRAPH C.



GRAPH D.



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

22. Simplify: $\dfrac{\left(-4a^2b^5\right)^3 a^{-6}b^7}{b^{-8}}$. **Show work.**

---

23. Points (–7, 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?

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

---

25. Phil, a resident of Metropolis, pays Metropolis an annual tax of \$50 plus 1.8% of his annual income. If Phil paid \$1,526 in tax, what was Phil's income? **Show work.**

---

26. Let $f(x) = 4x^2 - 60$ and $g(x) = x - 3$.

(a) Find the composite function $(f \circ g)(x)$ and simplify. **Show work.**
(b) Find $(f \circ g)(-2)$. **Show work.**

---

27. Find the exact solutions and simplify as much as possible: $9x^2 + 20 = 24x$. **Show work.**

---

28. Given the function $f(x) = 3 + \frac{1}{7}x$, find a formula for the inverse function. **Show work.**

---

29. The Travel Time bus company has determined that when x tourists are given a particular bus tour, the profit P (in dollars) is given by

$$P(x) = -0.25\,x^2 + 29.50x - 330$$

(a) What is the company's profit if 46 tourists are given the tour?

(b) How many tourists should be given the tour in order to maximize the company's profit? **Show work.**

---

30. Solve: $\frac{x-7}{x-5} + \frac{20}{x^2-25} = 0$. **Show work.**
