Math 125 DEPARTMENT FINAL EXAM TEST# 218

Version 3

Directions: DO NOT WRITE ON THIS EXAM. USE THE SCRATCH PAPER PROVIVED. Translate your answers to the SCANTRON form for all problems 1-40. **Good luck!** You have 2 HOURS to complete this exam.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Write the first three terms of the expansion.

1) $(x + 5)^{20}$

A) $x^{20} + 100x^{19} - 4750x^{18}$

B) $x^{20} + 4750x^{19} + 4750x^{18}$

C) $x^{20} + 100x^{19} + 4750x^{18}$

D) $x^{20} + 950x^{19} + 4750x^{18}$

Find all real solutions to the system of equations using the addition method.

2) $2x^2 + y^2 = 17$

$3x^2 - 2y^2 = -6$

A) (2, -3), (-2, 3)

B) (1, 3), (-1, -3)

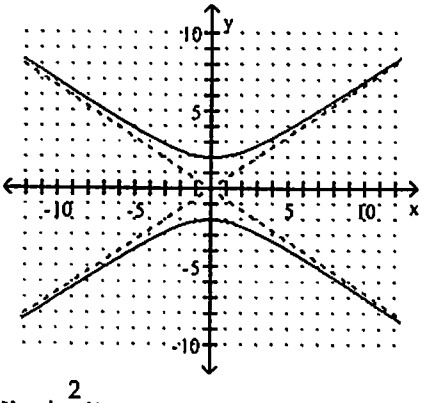
C) (1, 3), (1, -3), (-1, 3), (-1, -3)

D) (2, 3), (2, -3), (-2, 3), (-2, -3)

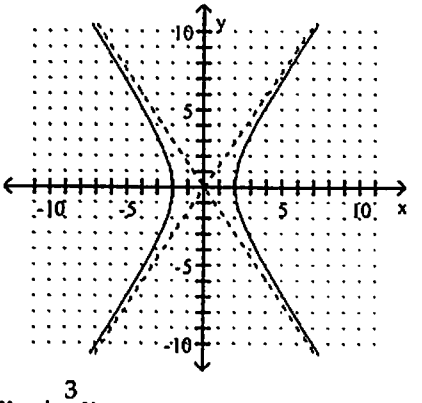
Write the equation in standard form (if necessary) and determine the equations of the asymptotes. Then graph the equation.

3) $\frac{y^2}{9} - \frac{x^2}{4} = 1$

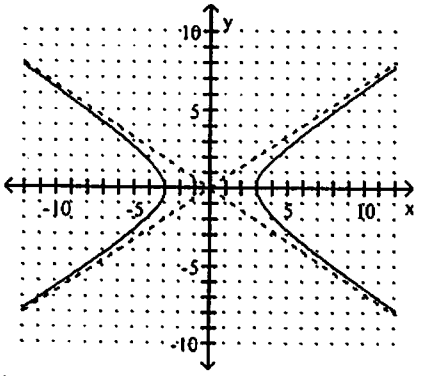
A) $y = \pm\frac{2}{3}x$



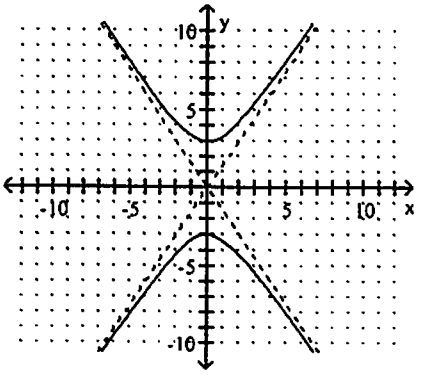
B) $y = \pm\frac{3}{2}x$



C) $y = \pm\frac{2}{3}x$



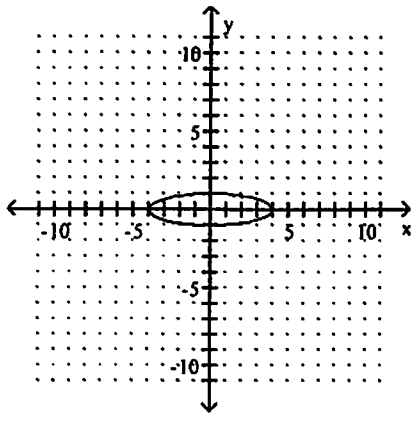
D) $y = \pm\frac{3}{2}x$



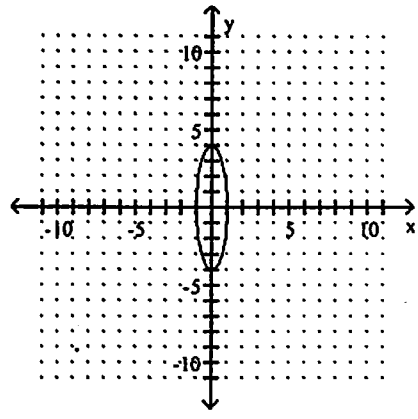
Graph the equation.

4) $\frac{x^2}{16} + \frac{y^2}{1} = 1$

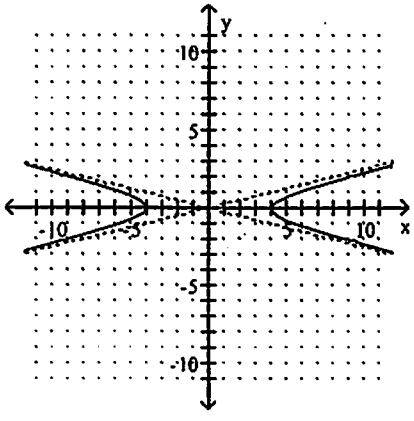
A)



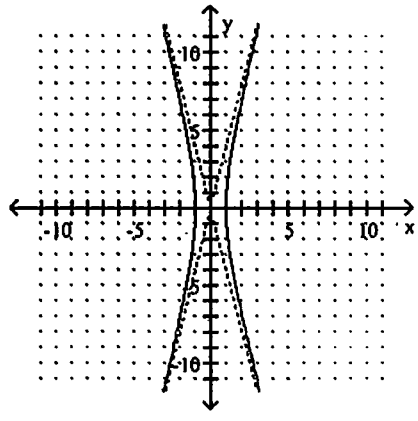
B)



C)



D)



Write the equation of the circle with the given center and radius.

5) Center (0, 2), radius $\sqrt{13}$

A) $x^2 + (y - 2)^2 = 13$

B) $(x - 2)^2 + y^2 = 169$

C) $x^2 + (y + 2)^2 = 13$

D) $(x + 2)^2 + y^2 = 169$

Solve the equation. Use a calculator where appropriate. If the answer is irrational, round to the nearest hundredth.

6) $\log(4 + x) - \log(x - 4) = \log 5$

A) $\frac{5}{2}$ B) 6 C) -6 D) no solution

Solve the equation without using a calculator.

7) $2^{(3x - 5)} = 16$

A) $\frac{1}{8}$ B) 8 C) -3 D) 3

Solve the problem.

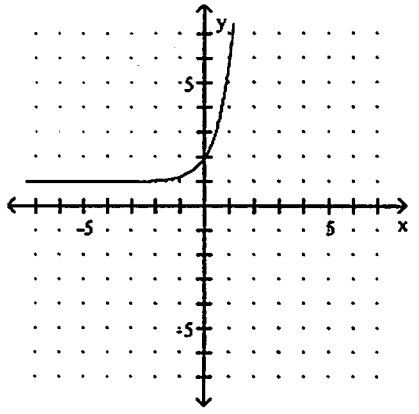
8) The value V of a car that is t years old can be modeled by $V(t) = 19{,}572(0.85)^t$. According to the model, when will the car be worth \$6000? Round to the nearest tenth of a year.

A) 0.9 yr B) 2.3 yr C) 62.4 yr D) 7.3 yr

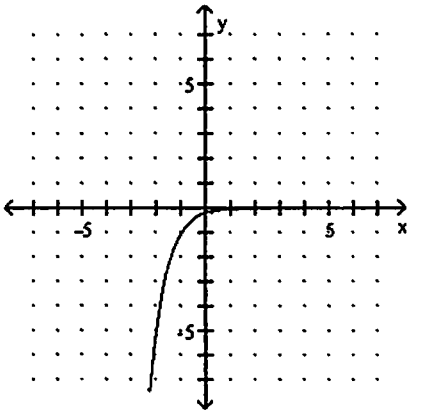
Graph the function.

9) $f(x) = 5^x + 1$

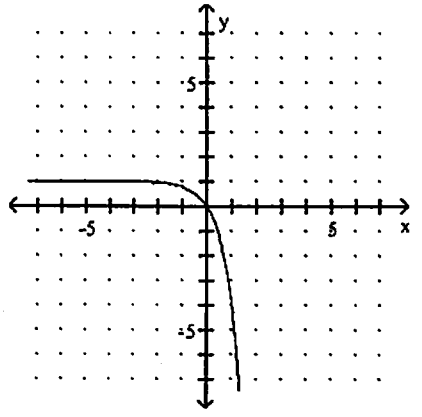
A)



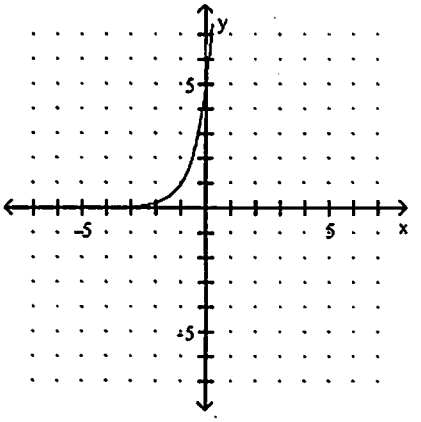
B)



C)



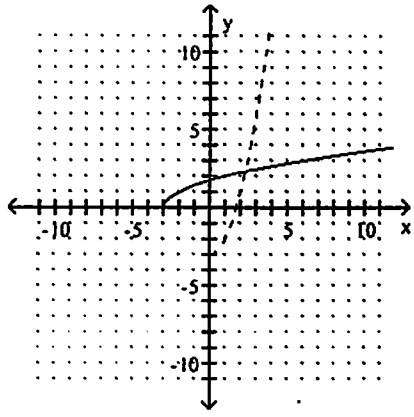
D)



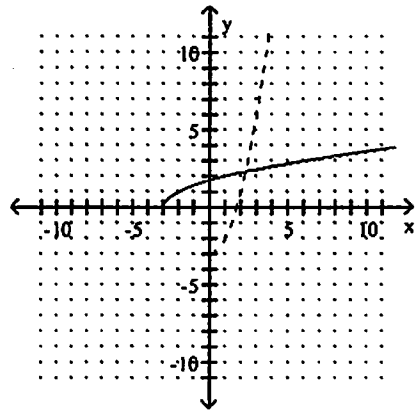
A one-to-one function f is given. Find $f^{-1}(x)$ and graph f(x) with a solid line and $f^{-1}(x)$ with a dotted line on the same axes.

10) $f(x) = \sqrt{x+3}, x \geq -3$

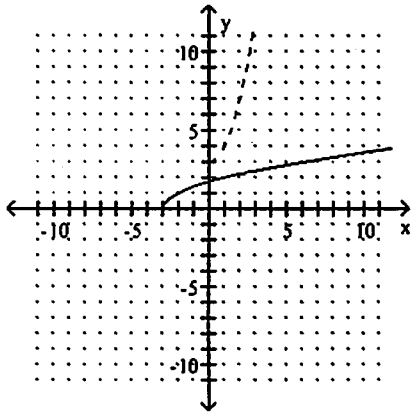
A) $f^{-1}(x) = x^2 + 3, x \geq 0$



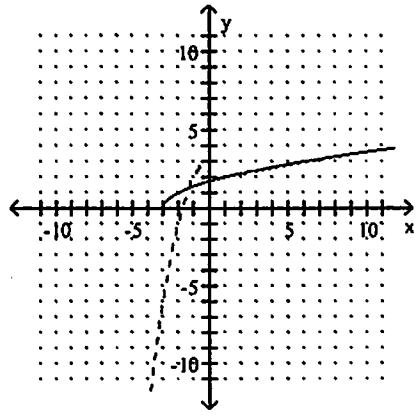
B) $f^{-1}(x) = x^2 - 3, x \geq 0$



C) $f^{-1}(x) = x^2 + 3, x \geq 0$



D) $f^{-1}(x) = -x^2 + 3, x \leq 0$



Write the equation in logarithmic form.

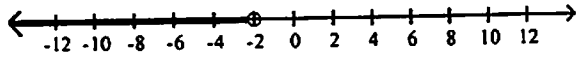
11) $s^z = q$

A) $\log_s q = z$ B) $\log_s z = q$ C) $\log_q s = z$ D) $\log_q z = s$

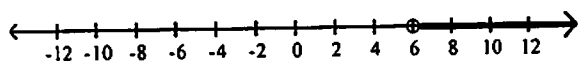
Solve the inequality and graph the solution on a number line.

12) $x^2 - 4x - 12 < 0$

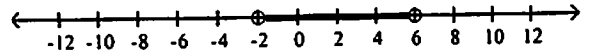
A)



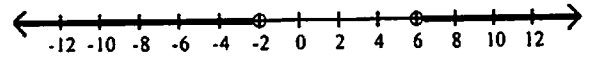
B)



C)



D)



Solve the problem.

13) Amy can clean the house in 8 hours. When she works together with Tom, the job takes 6 hours. How long would it take Tom, working by himself, to clean the house?

A) 24 hr B) 2 hr C) $24\frac{1}{2}$hr D) 25hr

Solve the equation.

14) $2x - 14\sqrt{x} - 16 = 0$

A) 8 B) 64 C) 1, 8 D) 1, 64

Solve the formula for the specified variable.

15) $P = \frac{A}{1 + rt}$ for r

A) $r = \frac{A - P}{Pt}$ B) $r = \frac{P - 1}{At}$ C) $r = \frac{P - A}{1 + t}$ D) $r = P - tA$

Solve the equation by the quadratic formula.

16) $2x^2 + 10x + 3 = 0$

A) $\frac{-10 \pm \sqrt{19}}{2}$ B) $\frac{-5 \pm \sqrt{19}}{2}$ C) $\frac{-5 \pm \sqrt{19}}{4}$ D) $\frac{-5 \pm \sqrt{31}}{2}$

Divide.

17) $\frac{4}{7 + i}$

A) $\frac{7}{12} - \frac{1}{12}i$ B) $\frac{14}{25} - \frac{2}{25}i$ C) $\frac{7}{12} + \frac{1}{12}i$ D) $\frac{14}{25} + \frac{2}{25}i$

Solve and check your solution(s). If the equation has no real solution, so state.

18) $\sqrt{18y - 27} = y + 3$

A) -5 B) 6 C) 4 D) -6

Solve the problem.

19) The amount of time it takes a swimmer to swim a race is inversely proportional to the average speed of the swimmer. A swimmer finishes a race in 60 seconds with an average speed of 5 feet per second. Find the average speed of the swimmer if it takes him 100 seconds to finish the race.

A) 2 ft/sec B) 5 ft/sec C) 3 ft/sec D) 4 ft/sec

Solve the equation and check your solution.

20) $1 + \frac{1}{x} = \frac{12}{x^2}$

A) 4, -3 B) $-\frac{1}{4}, \frac{1}{3}$ C) -4, 3 D) 4, 3

Simplify.

21)

$$\frac{1 - \frac{4}{x}}{x - \frac{16}{x}}$$

A) $\frac{1}{x - 4}$ B) $x + 4$ C) $\frac{1}{x + 4}$ D) $x - 4$

Add or subtract.

22) $\frac{6x}{x + 1} + \frac{7}{x - 1} - \frac{12}{x^2 - 1}$

A) $\frac{6x - 5}{x + 1}$ B) $\frac{6x - 5}{x - 1}$ C) $\frac{6x}{x - 1}$ D) $\frac{x + 1}{x - 1}$

Factor the polynomial completely.

23) $4y^4 - 49y^2$

A) $y^2(2y - 7)(2y + 7)$ B) $(2y^2 - 7)^2$

C) $(2y^2 - 7)(2y^2 + 7)$ D) $y^2(2y - 7)^2$

Solve.

24) $6y^2 + 13y + 6 = 0$

A) $-\frac{3}{2}, -\frac{2}{3}$ B) $\frac{3}{2}, -\frac{2}{3}$ C) $-\frac{1}{2}, -\frac{1}{3}$ D) $\frac{3}{2}, \frac{2}{3}$

Find the x-intercepts of the graph of the equation.

25) $y = 5x^2 - 35x + 50$

A) (0, 0), (2, 0), (5, 0) B) (5, 0), (2, 0), (5, 0)

C) (-2, 0), (-5, 0) D) (2, 0), (5, 0)

Solve the problem.

26) The area of a rectangle is $24x^2 - 12x$. The area of a smaller rectangle is $16x - 8$. Find an expression, in factored form, for the difference of the areas of the two rectangles.

A) $4(3x - 1)(2x + 2)$ B) $(4x - 1)(6x - 1)$ C) $4(2x + 1)(3x - 2)$ D) $4(2x - 1)(3x - 2)$

Factor.

27) $1000c^3 + 27$

A) $(1000c + 3)(c^2 - 30c + 9)$ B) $(10c + 3)(100c^2 - 30c + 9)$

C) $(10c - 3)(100c^2 + 30c + 9)$ D) $(10c + 3)(100c^2 + 9)$

Divide using synthetic division.

28) $\dfrac{2x^3 - 5x^2 - 3x - 34}{x - 4}$

A) $2x^2 - x + 11 + \dfrac{1}{x - 4}$ B) $2x^2 + 3x + 9$

C) $2x^3 + 3x + \dfrac{2}{x - 4}$ D) $2x^2 + 3x + 9 + \dfrac{2}{x - 4}$

Simplify.

29) $(3m + 9m^3) - (-9 - 4m - 3m^3)$

A) $6m^3 + 7m + 9$ B) $12m^3 + 7m - 9$ C) $6m^3 + 7m - 9$ D) $12m^3 + 7m + 9$

Solve the problem.

30) The Little Town Fine Arts Center charges \$23 per adult and \$15 per senior citizen for its performances. On a recent weekend evening when 529 people paid admission, the total receipts were \$9023. How many who paid were senior citizens?

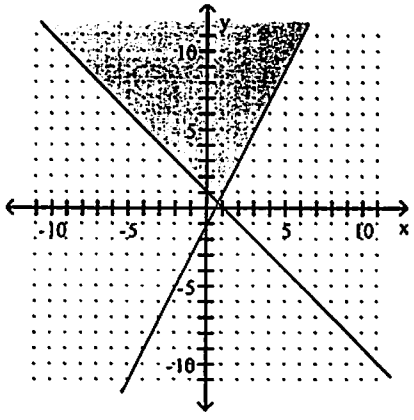
A) 303 senior citizens B) 393 senior citizens

C) 226 senior citizens D) 136 senior citizens

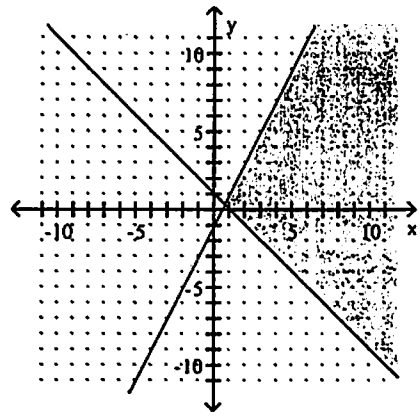
Determine the solution to the system of inequalities.

31) $y \geq 2x - 1$
$x + y \leq 1$

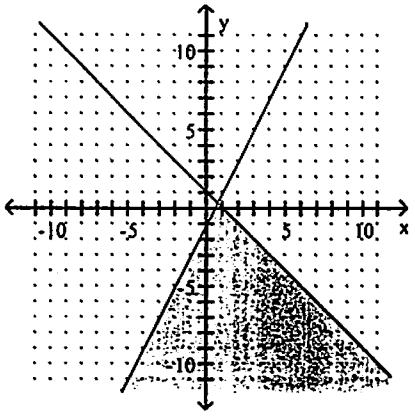
A)



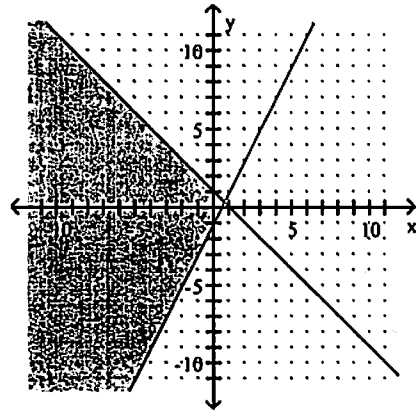
B)



C)

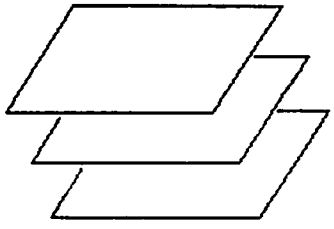


D)



Solve the problem.

32) Three planes are parallel as illustrated below. Is the system consistent, inconsistent, or dependent?



A) inconsistent
B) consistent, not dependent
C) consistent, dependent

Find the solution to the system of equations by substitution.

33) $x + 3y + 2z = 7$
$3y + 5z = -13$
$z = -5$

A) (5, 4, -5) B) (4, 5, -5) C) (-5, 4, 5) D) (5, -5, 4)

Evaluate the determinant.

34) $\begin{vmatrix} 4 & 0 & 0 \\ 8 & 5 & 7 \\ 4 & 4 & 6 \end{vmatrix}$

A) -8 B) 13 C) 8 D) 232

Use the point-slope form to find the equation of a line with the given properties. Write the equation in slope-intercept form.

35) Through (-5, -8) and (-8, 7)

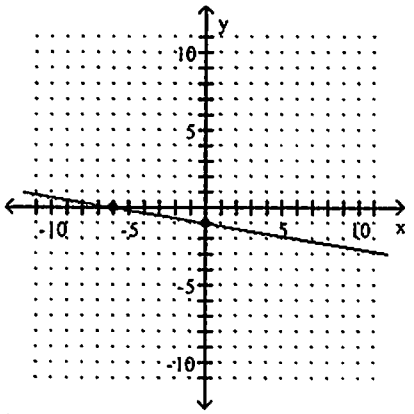
A) $y + 8 = -5(x + 5)$ B) $y = mx - 33$

C) $y = -5x - 33$ D) $y = 5x - 33$

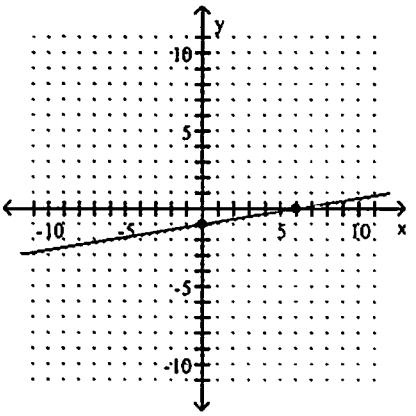
Graph the linear function by plotting the x- and y-intercepts.

36) $-3x - 18y = 18$

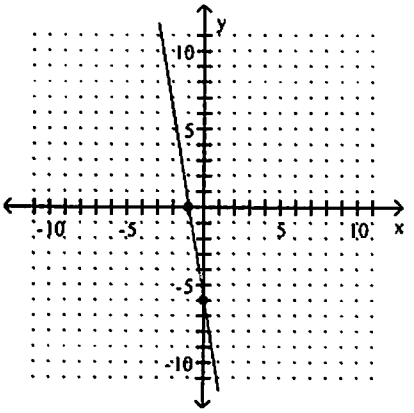
A) intercepts: (0, -1), (-6, 0)



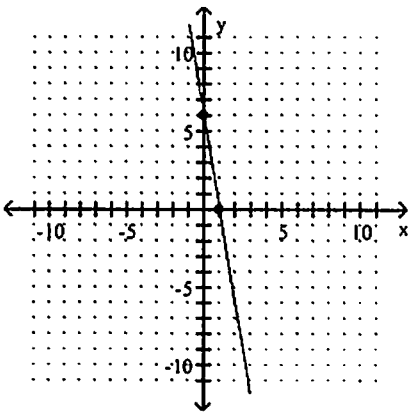
B) intercepts: (0, -1), (6, 0)



C) intercepts: (0, -6), (-1, 0)



D) intercepts: (0, 6), (1, 0)



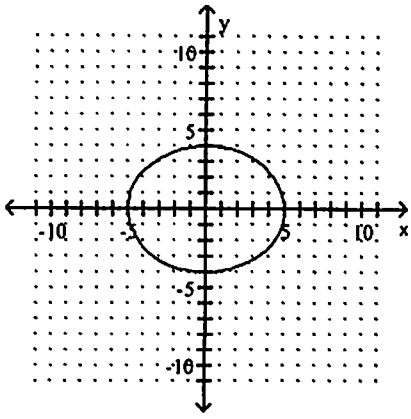
Evaluate the function for the indicated value.

37) $f(x) = \dfrac{x^2 - 3}{x^3 + 7x}$; find $f(2)$

A) $\frac{1}{8}$ B) $\frac{1}{22}$ C) $\frac{2}{11}$ D) $\frac{1}{15}$

Determine whether the graph illustrated represents a function. Give the domain and range of the relation or function.

38)



A) function
domain: $\{y \mid -4 \le y \le 4\}$
range: $\{x \mid -5 \le x \le 5\}$

B) function
domain: $\{x \mid -5 \le x \le 5\}$
range: $\{y \mid -4 \le y \le 4\}$

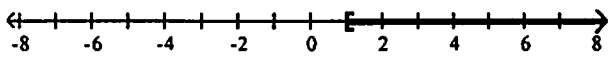
C) not a function
domain: $\{y \mid -4 \le y \le 4\}$
range: $\{x \mid -5 \le x \le 5\}$

D) not a function
domain: $\{x \mid -5 \le x \le 5\}$
range: $\{y \mid -4 \le y \le 4\}$

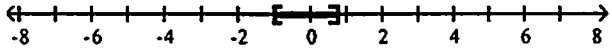
Solve the inequality and graph the solution set.

39) $|8x - 1| \le 7$

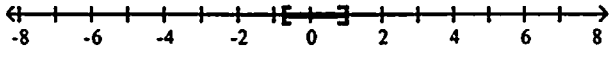
A) $[1, \infty)$



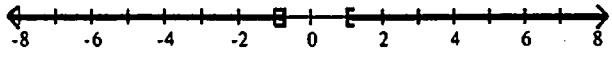
B) $\left[-1, \frac{3}{4}\right]$



C) $\left[-\frac{3}{4}, 1\right]$



D) $\left(-\infty, -\frac{3}{4}\right] \cup [1, \infty)$



Solve the equation.

40) $(y - 4) - (y + 3) = 8y$

A) $\left\{-\frac{7}{2}\right\}$ B) $\left\{-\frac{7}{4}\right\}$ C) $\left\{-\frac{5}{8}\right\}$ D) $\left\{-\frac{7}{8}\right\}$