MATH 250/GRACEY
REVIEW

Name_____

Tell whether or not the relation is a function.

1) {(–9,–8), (–9,5), (1,2), (6,–6), (10,–9)}

Find the domain of the function.

2) $f(x) = \frac{x}{x - 7}$

3) $f(x) = \frac{3}{x + 7}$

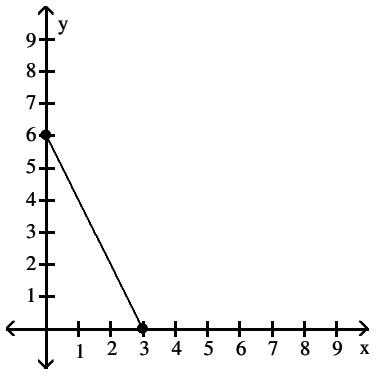
4) $f(x) = 4x^2 + 8x - 8$

By graphing the function, visually estimate its domain and range.

5) $h(x) = x^2 + 7$

Find the domain and range of the function represented in the graph.

6)



Solve the problem.

7) The function H described by H(x) = 2.75x + 71.48 can be used to estimate the height, in centimeters, of a woman whose humerus (the bone from the elbow to the shoulder) is x cm long. Estimate the height of a woman whose humerus is 31.39 cm long.

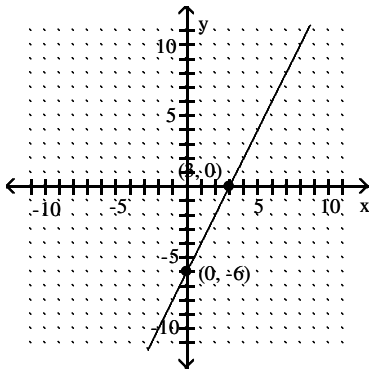
The following table contains input–output values for a function. Is this function linear?

8)

x	y
9	80
12	143
15	224
18	323
21	440
24	575
27	728

Find the slope of the line.

9)



Write a slope–intercept equation for a line with the given characteristics.

10) Passes through (–4, –7) and (–6, 3)

Determine whether the pair of lines is parallel, perpendicular, or neither.

11) $y = 3 - x$
$y = x + 3$

Determine the equation of the line described. Put answer in the slope–intercept form, if possible.

12) Through (–1, –6), perpendicular to $y = -\frac{5}{8}x + \frac{43}{8}$

Solve the problem.

13) The information in the chart below gives the salary of a person for the stated years. Model the data with a linear function using the points (1, 24,300) and (3, 26,600). Then use this function to predict the salary for the year 2005.

Year, x	Salary, y
1990, 0	$23,500
1991, 1	$24,300
1992, 2	$25,200
1993, 3	$26,600
1994, 4	$27,200

Graph the function. Use the graph to find any relative maxima or minima.

14) $f(x) = -1.9x^4 + 34.2x^2 - 10.2$

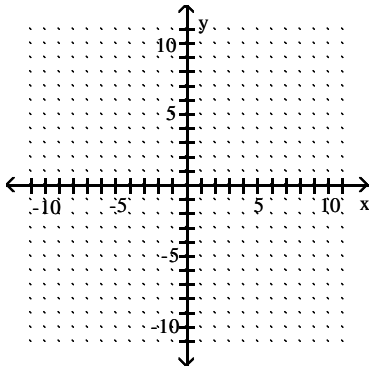
Solve.

15) From a 15–inch by 15–inch piece of metal, squares are cut out of the four corners so that the sides can then be folded up to make a box. Let x represent the length of the sides of the squares, in inches, that are cut out. Express the volume of the box as a function of x. Graph the function and from the graph determine the value of x, to the nearest tenth of an inch, that will yield the maximum volume.

Graph the function.

16)

$$f(x) = \begin{cases} 4 - x, & \text{for } x \le 2 \\ 1 - 3x, & \text{for } x > 2 \end{cases}$$



For the pair of functions, find the indicated sum, difference, product, or quotient.

17) Find $(f + g)(-2)$ when $f(x) = x - 2$ and $g(x) = x - 3$.

Solve.

18) Acme Communication finds that the total revenue function associated with producing a new type of cellular phone is $R(x) = 210x - x^2$, and the total cost function is $C(x) = 5000 + 7x$, where x represents the number of units of cellular phones produced. Find the total profit function, $P(x)$.

Compute and simplify the difference quotient $\frac{f(x+h) - f(x)}{h}$, $h \neq 0$.

19) $g(x) = 6x^2 + 5x - 4$

Solve.

20) A computer company invested a total of \$365 million in research and development in its scanners and video digitizers. If the amount the company spent on research and development on scanners was \$58 million than was spent on research and development on its video digitizers, how much in fact did the company spend on research and development on its scanners?

Find the zeros of each linear function.

21) $f(x) = x + 4$

Simplify. Write your answers in the form of a+ib, where a and b are real numbers.

22) $\frac{\sqrt{3} + 8i}{3 - 7i}$

Simplify.

23) i^{12}

Solve.

24) $15a^3 - 9a^2 + 10a - 6 = 0$

25) $3x^2 = 33$

26) $4z^2 + 2 = 258$

Solve the equation.

27) $x^2 + 10x = -24$

Find the zeros of the function algebraically. Give exact answers.

28) $f(x) = x^2 - 5x + 1$

Classify the polynomial as constant, linear, quadratic, cubic, or quartic, and determine the leading term and the degree of the polynomial.

29) $g(x) = 329x^2 + 4610x^3$

Use the intermediate value theorem, if possible, to determine whether the function f has a real zero between a and b.

30) $f(x) = x^3 + 3x^2 + 6x + 4$; $a = 2$, $b = 4$

Using a graphing calculator, estimate the range of the polynomial function.

31) $f(x) = -x^5 + x^4$

A polynomial P(x) and a divisor d(x) are given. Express P(x) in the form d(x)·Q(x) + R(x), where Q(x) is the quotient and R(x) is the remainder.

32) $P(x) = 3x^3 - x^2 + 2x + 7$
$d(x) = x + 1$

Use synthetic division to find the quotient and the remainder.

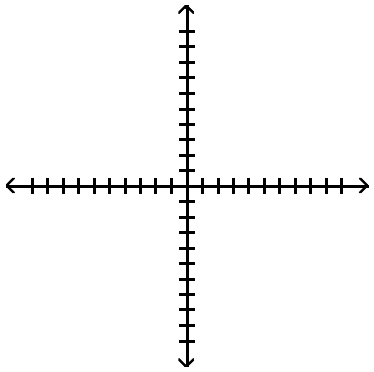
33) $(3x^5 + 4x^4 + 2x^2 - 1) \div (x + 2)$

Provide the requested response.

34) Suppose that a polynomial function of degree 5 with rational coefficients has 6, $-2 + 4i$, $4 - \sqrt{3}$ as zeros. Find the other zeros.

Graph the function, showing all asymptotes (those that do not correspond to an axis) as dashed lines. List the x– and y–intercepts.

35) $f(x) = \dfrac{1}{x + 2}$



Solve.

36) $x^2 + 10x + 25 \le 0$

37) $\frac{x}{x^2 + 3x - 4} + \frac{2}{x^2 - 16} \leq \frac{2x}{x^2 - 5x + 4}$

Find an equation of variation for the given situation.

38) m varies directly as p, and $m = 56$ when $p = 7$.

39) y varies inversely as x, and $y = 13$ when $x = 17$

40) y varies jointly as x and w and inversely as z, and $y = \frac{9}{2}$ when $x = 2$, $w = 4$, and $z = 16$.

Solve the exponential equation.

41) $3^{(12 - 3x)} = 27$

42) $e^{-t} = 0.03$

Solve the logarithmic equation.

43) $\log_{16} x = \frac{1}{2}$

44) $\log (x + 3) = 1 - \log x$

45) $\ln(5x - 1) = \ln 6 - \ln (x - 6)$

Solve.

46) How long will it take for \$5600 to grow to \$ 33,700 at an interest rate of 5.8% if the interest is compounded quarterly? Round the number of years to the nearest hundredth.

Solve the problem.

47) Use the formula $N = Ie^{kt}$, where N is the number of items in terms of the initial population I, at time t, and k is the growth constant equal to the percent of growth per unit of time. There are currently 75 million cars in a certain country, decreasing by 5.5% annually. How many years will it take for this country to have 52 million cars? Round to the nearest year.

State in which quadrant the terminal side of the given angle lies.

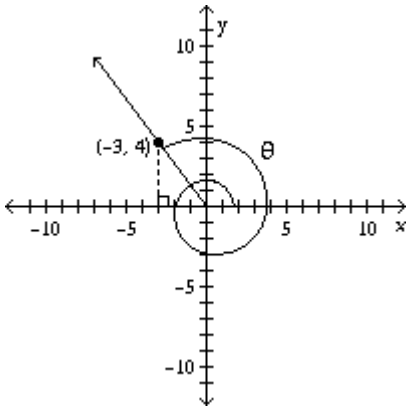
48) 259°10'

Find the measures of two angles, one positive and one negative, that are coterminal with the given angle.

49) 83°

Find the trigonometric function value for the angle shown.

50) $\sin \theta$



Find the exact function value if it exists.

51) sin 300°

52) cos (–150°)

Find the exact function value.

53) tan 780°

Convert to radian measure. Leave your answer in terms of π.

54) –620°

Convert to radian measure. Round to two decimal places.

55) –149.1°

Convert to degree measure. Round to two decimal places, if necessary.

56) $-\frac{10}{3}\pi$

Solve.

57) A bicycle wheel rotates 76 times in 1 minute. Through how many degrees does a point on the tip of the wheel move in 20 seconds?

58) A pulley rotates through 83° in one minute. How many rotations does the pulley make in an hour?

Find the measures of two angles, one positive and one negative, that are coterminal with the given angle.

59) 130°

60) –7°

61) –249°

Find the function value using coordinates of points on the unit circle.

62) $\sin \frac{-7\pi}{4}$

63) $\cos 2\pi$

64) $\cos \frac{-5\pi}{6}$

Use a calculator to find a decimal approximation for the indicated function value. Round your answer to four decimal places.

65) $\sin \frac{6\pi}{5}$

Simplify.

66) $\sin(4x + 5y) - \sin(4x - 5y)$

Solve, finding all solutions in [0, 2π).

67) $\sqrt{48}\tan x - 4 = 0$

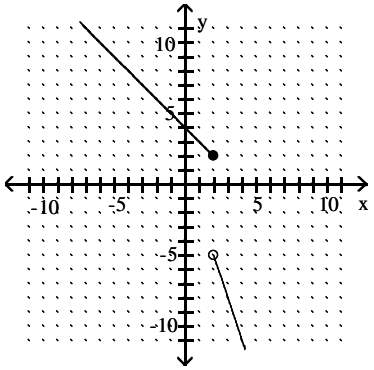
Solve, finding all solutions in [0, 2π).

68) $\sin x = 1 - 2\sin^2 x$

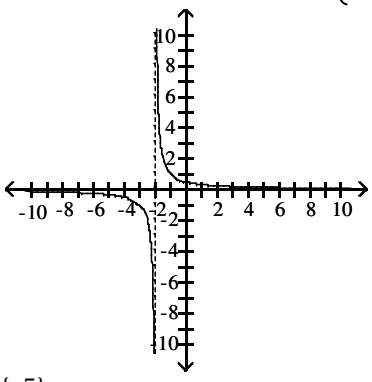
69) $\sin 2x + \sin x = 0$

70) $\sin\frac{x}{2} = 2\cos 2x$

1) No
2) $(-\infty, 7) \cup (7, \infty)$
3) $(-\infty, -7) \cup (-7, \infty)$
4) $(-\infty, \infty)$
5) Domain = $(-\infty, \infty)$; range = $[7, \infty)$
6) Domain: [0, 3]; Range: [0, 6]
7) 157.8025 cm
8) No
9) 2
10) $y = -5x - 27$
11) Perpendicular
12) $y = \frac{8}{5}x - \frac{22}{5}$
13) $40,750
14) Relative minimum of −10.2 at x = 0; Relative maxima of 143.7 at x = −3 and 143.7 at x = 3
15) 2.5 inches
16)



17) −9
18) $P(x) = -x^2 + 203x - 5000$
19) 12x + 5 + 6h
20) $211.5 million
21) −4
22) $\frac{-56 + 3\sqrt{3}}{58} + \frac{24 + 7\sqrt{3}}{58}\,i$
23) 1
24) $\frac{3}{5}$
25) $\pm\sqrt{11}$
26) ±8
27) −4, −6
28) $\frac{5 \pm \sqrt{21}}{2}$
29) Cubic; $4610x^3$; 3
30) Cannot use the intermediate value theorem
31) $(-\infty, \infty)$
32) $(x + 1)\cdot(3x^2 - 4x + 6) + 1$
33) $Q(x) = (3x^4 - 2x^3 + 4x^2 - 6x + 12)$; $R(x) = -25$
34) $-2 - 4i, 4 + \sqrt{3}$
35) No x−intercepts, y−intercept: $\left(0, \frac{1}{2}\right)$;



36) {−5}
37) $[-5 - \sqrt{23}, -4) \cup [-5 + \sqrt{23}, 1) \cup (4, \infty)$
38) $m = 8p$
39) $y = \frac{221}{x}$
40) $y = \frac{9xw}{z}$
41) 3
42) 3.5066
43) 4
44) 2
45) $\frac{31}{5}$
46) 31.17 yr
47) 7 years
48) III
49) 443°; −277°
50) $\sin\theta = \frac{4}{5}$
51) $-\frac{\sqrt{3}}{2}$
52) $-\frac{\sqrt{3}}{2}$
53) $\sqrt{3}$
54) $-\frac{31}{9}\pi$
55) −2.60
56) −600°
57) 9120°
58) 13.8 rotations
59) 490°; −230°
60) 353°; −367°

61) 111°; –609°

62) $\frac{\sqrt{2}}{2}$

63) 1

64) $-\frac{\sqrt{3}}{2}$

65) –0.5878

66) 2 sin 5y cos 4x

67) $\frac{\pi}{6}, \frac{7\pi}{6}$

68) $x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}$

69) {0, 2.09, 3.14, 4.19}

70) {0.70, 2.61, 3.68, 5.58}