Name_____

[scientific calculator only]

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

      1) Through $(3, 10)$, parallel to $5x - 2y = 7$

Find a slope–intercept form equation for the line.

      2) Through $(0, 4)$, with slope $-\dfrac{2}{3}$

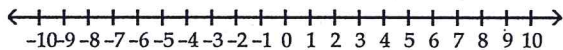**Find the distance between the points.**

      3) $(7, 6)\ (-1, -7)$

Solve the equation.

      4) $\dfrac{1}{4} + x = 11$

      5) $\dfrac{6x + 4}{4} + \dfrac{9x + 5}{5} = -\dfrac{6}{5}$

Solve the inequality and draw a number line graph of the solution.

      6) $4x - 7 \le 8x + 5$

Solve the inequality. Use algebra to solve the corresponding equation.

      7) $x^2 + 8 \le 5x$

Use interval notation to describe the interval of real numbers.

      8) x is greater than or equal to -1 and less than or equal to 3.

Describe how the graph of $y=x^2$ can be transformed to the graph of the given equation.

      9) $y = (x - 4)^2 + 19$

Determine algebraically whether the function is even, odd, or neither even nor odd.

      10) $f(x) = -8x^4 - 4x - 5$

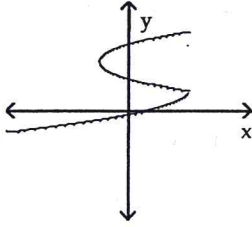**Find the domain of the given function.**

      11) $f(x) = \sqrt{10 - x}$

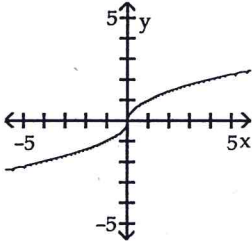**Find the range of the function.**

      12) $f(x) = 3 + \sqrt{8 - x}$

Determine whether the graph is the graph of a function.

13)

Determine if the function is one–to–one.

14)

Find the inverse of the function.

15) $f(x) = 5x - 3$

16) $f(x) = \sqrt{x + 4}$

Give the equation of the function whose graph is described.

17) The graph of $y = |x|$ is vertically stretched by a factor of 9.2. This graph is then reflected across the x–axis. Finally, the graph is shifted 0.69 units downward.

Identify intervals on which the function is increasing, decreasing, or constant.

18) $g(x) = 3 - (x + 1)^2$

Sketch the graph of the function in order to answer the following questions:
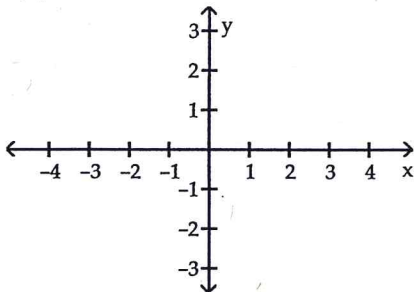**On what intervals is the function increasing? decreasing?**
Is the function odd, even, or neither?
Give the function's extrema, if any.
Find the horizontal asymptotes, if any.
How does the graph relate to a graph of one of the twelve basic functions?

19) $f(x) = e^{-x}$

Identify which of the twelve basic functions listed below fit the description given.

$y = x, y = x^2, y = x^3, y = |x|, y = \dfrac{1}{x}, y = e^x, y = \sqrt{x}, y = \ln x, y = \sin x, y = \cos x, y = \text{int}(x), y = \dfrac{1}{1 + e^{-x}}$

20) The two functions that have end behavior $\displaystyle\lim_{x \to -\infty} f(x) = +\infty$

21) The three functions that are bounded above

22) The three functions that are even

23) The one function that is decreasing from $(0, \infty)$

Perform the requested operation or operations. Find the domain of each.

24) $f(x) = \sqrt{x + 9}; g(x) = \cos x$
Find $f - g$.
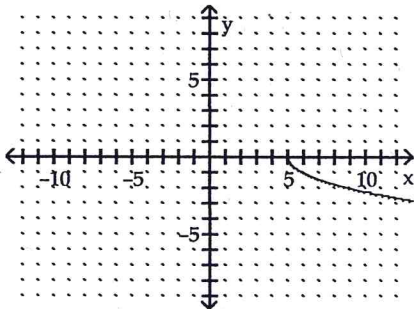
25) $f(x) = 7x + 9, g(x) = 6x^2$
Find $(fg)(x)$.

Perform the requested operation or operations.

26) $f(x) = \sqrt{x + 4}; \ g(x) = 8x - 8$, find $f(g(x))$.

27) $f(x) = \sqrt{x + 6}; g(x) = 8x - 10$
Find $f(g(x))$.

The graph is that of a function $y = f(x)$ that can be obtained by transforming the graph of $y = \sqrt{x}$. Write a formula for the function f.

28)

Use an equation to solve the problem.

29) A construction company builds a swimming pool with a perimeter of 58 m. The length is 5 m more than the width. Find the dimensions of the swimming pool?

Use the Rational Zeros Theorem to write a list of all potential rational zeros

30) $f(x) = 2x^3 - 5x^2 + 7x - 17$

Find all rational zeros.

31) $f(x) = x^3 - 8x^2 + 11x + 20$

Find the product of the complex number and its conjugate.

32) $-3 + 6i$

Find the vertex of the graph of the function.

33) $f(x) = (x - 6)^2 + 10$

Find the zeros of the function.

34) $f(x) = 3x^2 - 16x + 5$

Find all asymptote(s) of the given function.

35) $f(x) = \dfrac{x + 9}{x^2 + 4x + 2}$

36) $h(x) = \dfrac{(x - 6)(x + 1)}{x^2 - 4}$

Perform the indicated operation. Write the result in standard form.

37) $\left[-2 + 2i\sqrt{3}\right]^3$

Provide an appropriate response.

38) Let f be a polynomial function with real coefficients. If $-5, 3, -8 + 5i$, and $5 - 3i$ are zeros of f, what is the smallest possible degree that f can have?

Solve the equation.

39) $\dfrac{-5x^2 - 2}{x - 4} = \dfrac{-15x}{x - 4} + 2$

40) $x^2 - 4x + 13 = 0$

Solve the polynomial inequality.

41) $(x + 8)(x^2 - 4) > 0$

4

Solve the problem. Round as appropriate.

42) The gravitational attraction A between two masses varies inversely as the square of the distance between them. The force of attraction is 4 lb when the masses are 3 ft apart, what is the attraction when the masses are 6 ft apart?

Write the statement as a power function equation. Use k as the constant of variation.

43) The surface area of a sphere S varies directly as the square of its radius r.
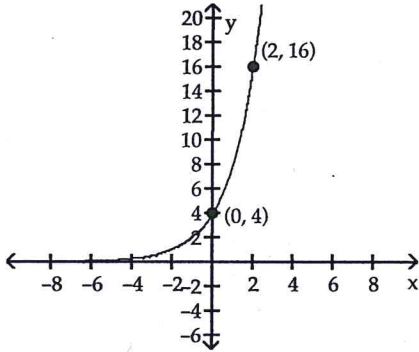
Write the product in standard form.

44) $9i(5 - 6i)$

45) $(4 + 9i) - (-2 + i)$

Compute the exact value of the function for the given x–value without using a calculator.

46) $f(x) = \left(\dfrac{1}{6}\right)^x$ for $x = -1$

Determine a formula for the exponential function.

47)

Decide if the function is an exponential function. If it is, state the initial value and the base.

48) $y = x^2$

49) $y = 5^x$

Find the exact solution to the equation (without a calculator).

50) $16\left(\dfrac{1}{2}\right)^{x/5} = 2$

51) $3^{7x} = 81$

52) $10 - \log_2(x + 7) = 9$

Rewrite the expression as a sum or difference or multiple of logarithms.

53) $\ln x^3 y^2$

Simplify the expression.

54) $10^{\log 5}$

Solve the equation.

55) $\log x^2 = 8$

Describe how to transform the graph of the basic function g(x) into the graph of the given function f(x).

56) $f(x) = \ln (3 - x) - 2$; $g(x) = \ln x$

Solve the problem.

57) The decay of 735 mg of an isotope is given by $A(t) = 735e^{-0.028t}$, where t is time in years. Find the amount left after 47 years.

State whether the function is an exponential growth function or exponential decay function, and describe its end behavior using limits.

58) $f(x) = 7^{-x}$

59) $f(x) = 0.8^x$

Use a calculator to find an approximate solution to the equation.

60) $\left(\frac{1}{5}\right)^x = 14$

Use the change of base rule to find the logarithm to four decimal places.

61) $\log_6 25.54$
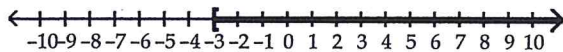
1) $y = \dfrac{5}{2}x + \dfrac{5}{2}$

2) $y = -\dfrac{2}{3}x + 4$

3) $\sqrt{233}$

4) $x = \dfrac{43}{4}$

5) $x = -\dfrac{32}{33}$

6)

7) No solution

8) $[-1, 3]$

9) Shift the graph of $y = x^2$ right 4 units and then up 19 units.

10) Neither

11) $(-\infty, 10]$

12) $[3, \infty)$

13) No

14) Yes

15) $f^{-1}(x) = \dfrac{x + 3}{5}$

16) $f^{-1}(x) = x^2 - 4, x \geq 0$

17) $y = -9.2|x| - 0.69$

18) Increasing: $(-\infty, -1)$; decreasing: $(-1, \infty)$

19) Decreasing on $(-\infty, \infty)$
    Neither odd nor even
    No extrema
    Horizontal asymptote: $y = 0$
    Graph is graph of $f(x) = e^x$ reflected across the y–axis

20) $y = x^2, y = |x|$

21) $y = \sin x, y = \cos x, y = \dfrac{1}{1 + e^{-x}}$

22) $y = x^2, y = \cos x, y = |x|$

23) $y = \dfrac{1}{x}$

24) $\sqrt{x + 9} - \cos x$; domain: $[-9, \infty)$

25) $42x^3 + 54x^2$; domain: $(-\infty, \infty)$

26) $f(g(x)) = 2\sqrt{2x - 1}$

27) $f(g(x)) = 2\sqrt{2x - 1}$

28) $f(x) = -(\sqrt{x} - 5)$

29) $17 \text{ m} \times 12 \text{ m}$

30) $\pm 1, \pm 17, \pm 1/2, \pm 17/2$

31) $4, 5, -1$

32) 45

1

33) $(6, 10)$

34) $\dfrac{1}{3}$ and 5

35) $y = 0$; $\quad x = -2 \pm \sqrt{2}$

36) VA $\ x = 2, x = -2 \qquad$ HA $\ y = 1$

37) 64

38) 6

39) $x = -\dfrac{2}{5}, 3$

40) $2 \pm 3i$

41) $(-8, -2) \cup (2, \infty)$

42) 1 lb

43) $S = kr^2$

44) $54 + 45i$

45) $6 + 8i$

46) 6

47) $f(x) = 4 \cdot 2^x$

48) Not an exponential function

49) Exponential Function; base = 5; initial value = 1

50) $x = 15$

51) $x = \dfrac{4}{7}$

52) $x = -5$

53) $3\ln x + 2\ln y$

54) 5

55) $\pm 10,000$

56) Reflect across the y–axis and then translate 3 units to the right and 2 units down.

57) 197

58) Exponential decay function; $\displaystyle \lim_{x \to -\infty} f(x) = \infty$; $\displaystyle \lim_{x \to \infty} f(x) = 0$

59) Exponential decay function; $\displaystyle \lim_{x \to -\infty} f(x) = \infty$; $\displaystyle \lim_{x \to \infty} f(x) = 0$

60) -1.640

61) 1.8084