

Name: \_\_\_\_\_  
Calculus Summer Packet

1.) Determine the x and y intercepts of  $y = x^2 - 8x + 12$ .

2.) Determine the value of "k" for which the graph of  $y = kx^3$  pass through the point (-2,1).

3.) Determine the slope of the line that passes through the points (-7,8) and (-1,8).

4.) Determine the value of "t" such that the following points are collinear.

(-3,3), (t,-1), (8,6)

5.) Determine the equation of the line that passes through (2,4) with a slope of  $-\frac{2}{3}$ .

6.) Determine the equation of the line that passes through (2,4) and is perpendicular to the line  $x + y = 0$ .

7.) Determine the equation of the line that passes through points (2,4) and (6,1).

8.) Determine the equation of the line that passes through (2,4) and is parallel to the x-axis.

9.) The purchase price of a new machine is \$12,500 and its value will decrease by \$850 per year. Use this information to write a linear equation that gives the value  $V$  of the machine  $t$  years after it is purchased. Find its value at the end of 3 years.

For #s 10-12, refer to the given function,  $f(x) = \begin{cases} x^2 + 2, & x < 0 \\ |x - 2|, & x \geq 0 \end{cases}$

10.) Determine  $f(-4)$ .

11.) Determine  $f(0)$ .

12.) Determine  $f(1)$ .

13.) Consider the equation  $x = 9 - y^2$ . Determine if this equation expresses  $y$  as a function of  $x$  and explain why.

For #s 14 and 15, refer to the equation  $y = \frac{7}{2x-10}$ .

14.) State the domain of this function.

15.) State the range of this function.

For #s 16-18, refer to the functions  $f(x) = 1 - x^2$  and  $g(x) = 2x + 1$ .

16.) Evaluate  $f(x) - g(x)$

17.) Evaluate  $f(x)g(x)$

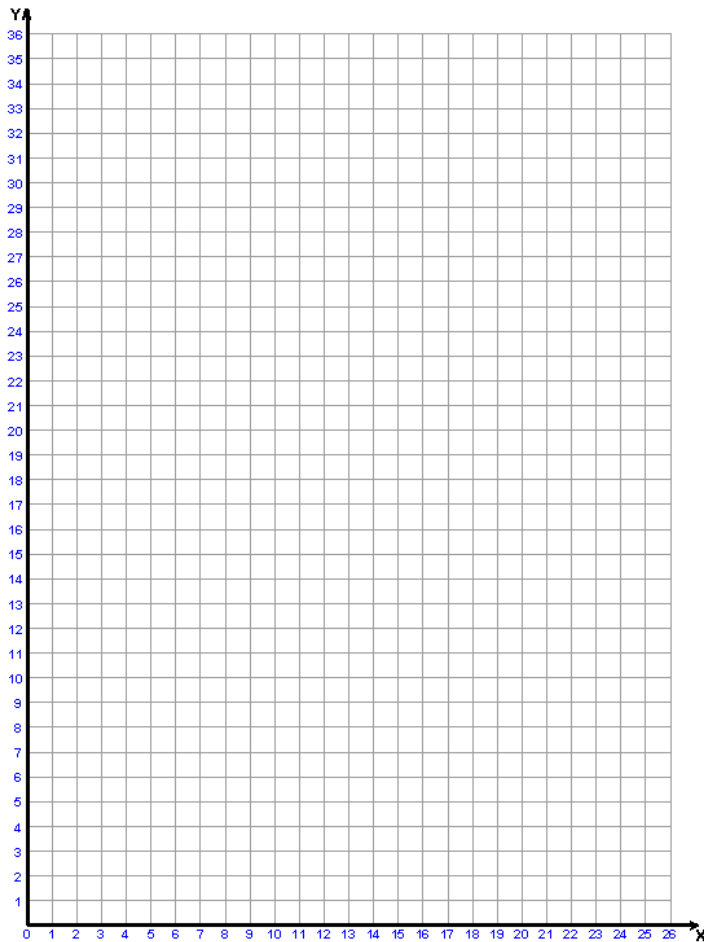
18.) Evaluate  $g(f(x))$

19.) A wire 24 inches long is to be cut into four pieces to form a rectangle whose shortest side has a length of  $x$ .

a.) Write the area  $A$  of the rectangle as a function of  $x$ .

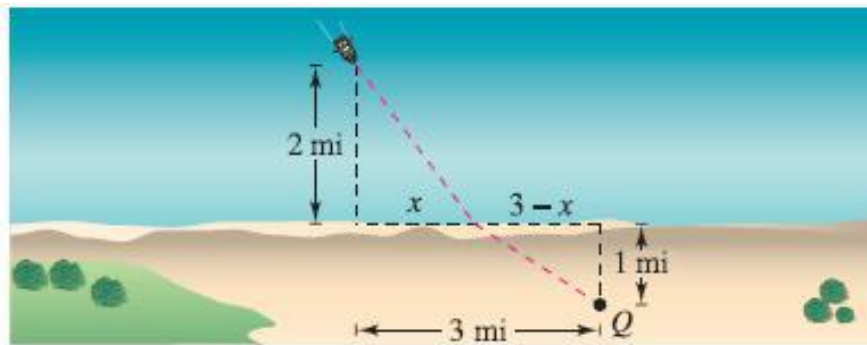
b.) Determine the domain of the function and use a graphing utility to graph the function over that domain.

c.) Use the graph of the function to approximate the maximum area of the rectangle. Make a conjecture about the dimensions that yield a maximum area.

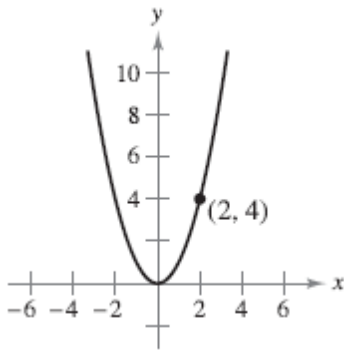


20.) Given the circle  $x^2 + y^2 - 6x - 8y = 0$ , determine the center and radius.

21.) You are in a boat 2 miles from the nearest point on the coast. You are to go to a point Q located 3 miles down the coast and 1 mile inland. You can row 2 miles per hour and walk at 4 miles per hour. Write the total time  $T$  of the trip as a function of  $x$ .



22.) One of the fundamental themes of calculus is to find the slope of the tangent line to a curve at a point. To see how this can be done, consider point  $(2,4)$  on the graph  $f(x) = x^2$ .



a.) Find the slope of the line joining  $(2,4)$  and  $(3,9)$ . Is the slope of the tangent line at  $(2,4)$  greater than or less than this number?

b.) Find the slope of the line joining  $(2,4)$  and  $(1,1)$ . Is the slope of the tangent line at  $(2,4)$  greater than or less than this number?

c.) Find the slope of the line joining  $(2,4)$  and  $(2.1,4.41)$ . Is the slope of the tangent line at  $(2,4)$  greater than or less than this number?

d.) Find the slope of the line joining  $(2,4)$  and  $(2 + h, f(2 + h))$  in terms of the nonzero number  $h$ . Verify that  $h = 1, -1,$  and  $0.1$  yield the solutions to parts (a) – (c) above.

e.) What is the slope of the tangent line at  $(2,4)$ ? Explain how you arrived at your answer.