Precalculus Name_____
Unit 1 Review

Graph the piece-wise function by hand and find the indicated values.

1. $f(x) = \begin{cases} x^2 + 1 & \text{if } x \le 1 \\ x - 2 & \text{if } 1 < x \le 4 \end{cases}$

a. $f(-1)$ = b. $f(2)$ =
c. $f(1)$ = d. $f(4)$ =

2. Describe how the graph of $g(x)$ can be obtained from the graph of $f(x) = \sqrt{x}$.

a. $g(x) = \frac{1}{2}\sqrt{x} - 1$
b. $g(x) = -\sqrt{x-2}$
c. $g(x) = 2\sqrt{3x+12}$

3. Find the equation of the function whose graph can be obtained by performing the translation, 3 units left, 1 unit up, and is horizontally compressed by a factor of ¼ on the function $f(x) = x^3$. Sketch the graphs.

4. State the domain of the following functions:

a. $f(x) = x^2 + 1$ b. $f(x) = \sqrt{x+2}$ c. $f(x) = \frac{x}{2x-1}$ d. $f(x) = \frac{\sqrt{x}}{x-4}$

5. Let $f(x) = x - 2$ and $g(x) = x^2 + 3$. Simplify. Find the domain of each. Write the domain in **interval notation**.

a. $(f + g)(x)$ b. $(f - g)(x)$

c. $(fg)(x)$ d. $\left(\frac{f}{g}\right)(x)$

6. Let $f(x) = 3x - 2$ and $g(x) = \sqrt{x}$ and $h(x) = \dfrac{\sqrt{x+2}}{x-3}$. Find the domain for a through c. Write the domain in **interval notation**.

a. $(f \circ g)(x)$ b. $(g \circ f)(x)$

c. $(h \circ f)(x)$ d. $(f \circ g)(9)$

7. Decide if the following functions are even, odd or neither:

a. $f(x) = 3x^6 - 5x^4$ b. $f(x) = x^2 + 2$ c. $f(x) = x^{101} + 11x$

8. A function, $h(x)$, contains the following points: (–1, 2) (5, –8) (4, 6) (–3, –7)

Name four points which would be a part of $h(x)$ if the function is:

a) symmetric to the line $y = x$ b) symmetric to the x-axis

c) symmetric to the origin d) symmetric to the line $y = -x$

9. Find the inverse of the functions algebraically. Are the inverses functions?

a. $f(x) = 2x^2 - 1$ b. $f(x) = \sqrt{3x+4}$ c. $f(x) = x - 1$

10. Determine if f and g are inverses of each other. Show all work.

a. $f(x) = x^5$ and $g(x) = \sqrt[5]{x}$ b. $f(x) = x^3 - 1$ and $g(x) = \sqrt[3]{x} - 1$

11. Express the function $h(x) = \dfrac{1}{(x-2)^2}$ as a composition of two functions.

12. The number of bacteria in a refrigerated food is given by

$$N(T) = 20T^2 - 80T + 500, \qquad 2 \le T \le 14$$

where T is the Celsius temperature of the food. When the food is removed from refrigeration, the temperature is given by

$$T(t) = 4t + 2, \qquad 0 \le t \le 3$$

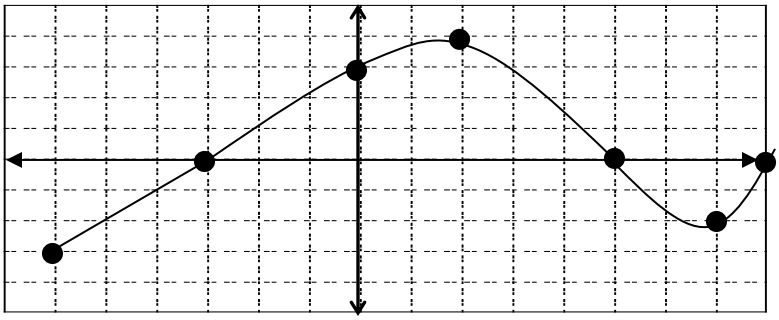
where t is the time in hours. Find the following:

a. The composite $N(T(t))$. What does this function represent?

b. The number of bacteria in the food when t = 2 hours.

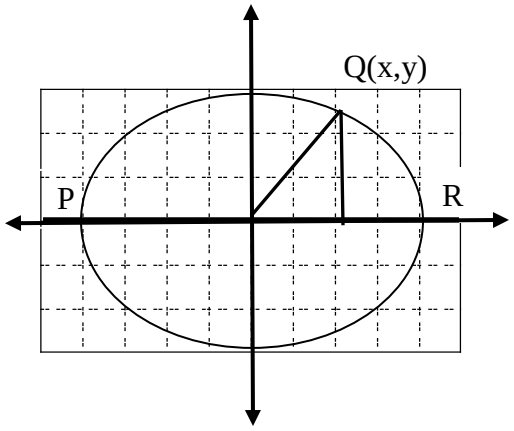
c. The time when the bacteria count reaches 2000.

13.



a. Find $f(0)$ and $f(-6)$
b. Is $f(2)$ positive or negative?
c. What are the x-intercepts of $f(x)$?
d. How often does y = -1 intersect $f(x)$?
e. What is $f(f(5))$?
f. What is the domain of the function?
g. What is the range of the function?
h. For what values is f(x) > 0
i. What interval is $f(x)$ increasing?
j. What interval is $f(x)$ decreasing?

14. Triangle PQR has a vertex on the semicircle $y = \sqrt{16 - x^2}$ and two vertices on the x-axis as shown below.



_____ a) Write the function A(x) that expresses the area as a function of the x-coordinate.

_____ b) What is the domain of the A(x)?