

Homework 1 June 14 , 2016

1. Let $h(t) = t + \frac{1}{t}$. Find the following:

a. $h(-2)$

b. $h(\frac{1}{3})$

c. $h(x)$

d. $h(\frac{1}{x})$

2. Consider $f(x) = x^2 + 1$.

a. Find $f(a)$.

b. Find $f(a + h)$.

c. Find the difference quotient, given by $\frac{f(a + h) - f(a)}{h}$ where $h \neq 0$.

3. A tank holds 50 gallons of water, which drains a leak at the bottom, causing the tank to empty in 20 minutes. The tanks drains faster when it is nearly full because the pressure on the leaker is greater. *Torricelli's Law* gives the volume of water remaining in the tank after t minutes as

$$V(t) = 50\left(1 - \frac{t}{20}\right)^2 \quad 0 \leq t \leq 20$$

- a. Find $V(0)$ and $V(20)$.
- b. What do your answers in part (a) represent?
4. You place a frozen Patti Labelle Sweet Potato Pie in an oven and bake it for an hour. Then you take it out and let it cool before eating it. Sketch a rough graph of the temperature of the pie as a function of time.

5. Evaluate the piecewise defined function at the indicated values.

$$f(x) = \begin{cases} 3x & \text{if } x < 0 \\ x + 1 & \text{if } 0 \leq x \leq 2 \\ (x - 2)^2 & \text{if } x > 2 \end{cases}$$

- a. $f(-5)$
- b. $f(0)$
- c. $f(1)$
- d. $f(2)$
- e. $f(5)$