Chapter R Worksheet 1   Due Date posted on Website   (*8 points*)

Objective: Functions are building blocks of calculus, modeling mathematical relationships.
This review assignment provides practice working with from 4 points of view: (1) algebraically using formulas and function notation, (2) numerically using tables of values, (3) graphically, (4) verbally interpreting the meaning of the function in the context of business applications.

1. The Housing and Real Estate commission for a city is investigating the adequacy of housing in light of projected population growth.

   The population of the city was 280,000 people in the year 2010. The population has been increasing at the rate of 3% per year and projections expect growth to continue the same pattern.
 $P = f(t) = 280000(1.03^t)$, where t = the number of years after 2010 (so $t = 0$ represents 2010).

   The housing supply in the city was adequate to house 300,000 people in the 2010. The housing supply has been growing at the rate that enables it to house an additional 10000 people per year, and projections expect housing growth to continue the same pattern.
   $S = h(t) = 300000 + 10000t$ where t = the number of years after 2010

a.   Complete the table that shows the population and housing projections every 5 years in over the 25 year period that started in 2010 (years 2010, 2015, 2020, 2025, 2030, 2035). (Round to the nearest integer.)

Year	t	Population P	Housing Supply S

people
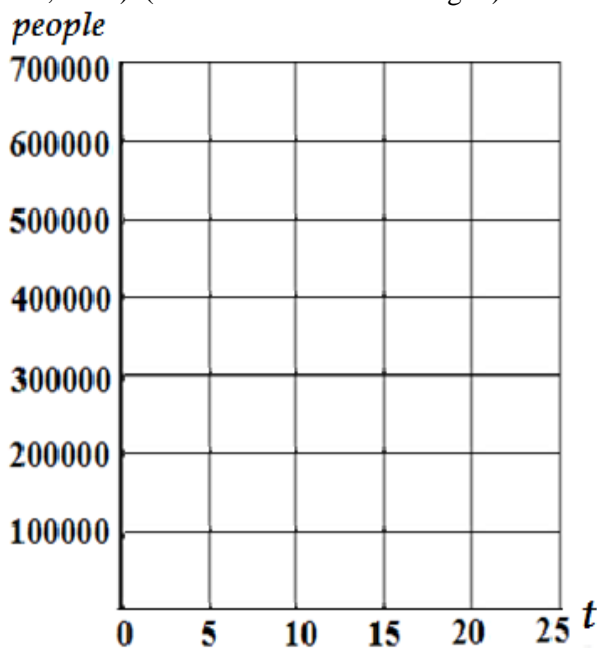
b.   Graph the population and housing functions by plotting the points from the table above and connecting them by a straight line or a smooth curve as appropriate for the function.

   Label the population function $P = f(t)$ and label the housing function $S = h(t)$.

   Use the graphs to answer to following questions.

c.   In approximately what year does the population equal 400,000 people.
                 Answer: In year _____, f(____) ≈ 400,000

d.   Estimate the year in which the population equals the housing supply.
       Approximately what is the population at that time?
                 Answer: In year _____, f (____) ≈ h(____) ≈ _____

e.   Which increases faster from 2010 and 2015, the population or housing supply? _____

f.   Which increases faster from 2030 and 2035, the population or housing supply? _____

g.   Based on the information from the table and the graph, what do you think the Housing and Real Estate Commission needs to be concerned about?

2. Rocky's Italian Restaurant purchased a new food truck, which it named the "Rolling Ristorante". The value V of the truck, in thousands of dollars, is a function of its age a after purchase, in years: $V = g(a) = 42 - 2.4a$.

a. Write a complete sentence that interprets the statement $g(4) = 32.4$ in the context of this problem.

_____

_____

b. Write a complete sentence that interprets the statement $g(5) - g(3) = -4.8$ in the context of this problem.

_____

_____

c. Find the age a when the value of the truck is equal to $0. Show algebraic work. *State answer to 1 decimal place.*

d. We can use a table to illustrate <u>some</u> values of the depreciation function. Fill in the table. *Answer to 1 decimal place.* (Because age is continuous, the table can <u>not</u> show all possible ages and values.)

a	0	1	2.5	5	7.5	10	15	
V								$0

e. State the "practical" domain and range. (The "practical" domain and range mean the set of values for a and V respectively that make sense for the situation in this problem.)

        Domain: _____   Range: _____

f. Graph $V = g(a)$ in your graphing calculator as Y1 = 42 – 2.4X.
(A possible graphing window is 0≤x≤20 , 0≤y≤50, or use the correct domain and range to see the entire function.)
Sketch the graph of function $V=g(a)$ completely over its "practical" domain in the axes below.
Label the numerical values of the horizontal and vertical intercepts on the graph.

V

                                                                        a

g. In complete sentences, interpret the meaning of the vertical and horizontal intercepts of this depreciation function

Vertical intercept is $g(\underline{\hspace{1cm}}) = \underline{\hspace{1cm}}$. Interpretation:_____

_____

Horizontal intercept is $g(\underline{\hspace{1cm}}) = \underline{\hspace{1cm}}$. Interpretation:_____

_____