Math 112 Written Homework: Combining Functions Student Name:_____

Instructor: Laird

Math 112 Section: 062

Directions: Show all work, and answer each question that is asked. Explanations should be given in complete sentences. All graphs should be drawn accurately on this sheet, and be fully labeled.

1. A shop has determined that the number of bottles of water they sell on a summer day is a function of the day's high temperature, and is approximately given by $N(T) = 4T + 27$, where T is the day's high temperature, and $80 \le T \le 110$ (degrees F). Suppose that the predicted high temperatures for the next 7 days are given in the table below.

t (day)	High temperature, T (degrees F)
1	95
2	96
3	97
4	98
5	99
6	100
7	101

Define the variables:

t :

T :

Express the high temperature as a function of the day.

Use this function to create a function that represents the number of bottles of water sold as a function of the day.

Find one ordered pair that would be on the graph of the new function (you don't have to sketch the graph), and explain what it tells you in practical terms.

2. An accident at an oil drilling platform is causing a circular-shaped oil slick to form. The volume of the oil slick is roughly given by $V(r) = 0.08\pi r^2$, where r is the radius of the slick in feet. In turn, the radius is increasing over time according to the function $r(t) = 0.5t$, where t is measured in minutes.

   Define the variables:

   r :

   t :

   V :

   Find $(V \circ r)(t)$.

   Give a practical interpretation of what this function tells you.

   After how many minutes will the volume of the slick be 225 cubic feet?

3. The following table shows the number of motor vehicle crash deaths for teens aged 13-19, separated by gender, for the years 2005-2015 (Data source: iihs.org).

Year (t)	Male (M)	Female (F)	M+F	M-F
2005	3,496	1,803		
2006	3,415	1,744		
2007	3,280	1,701		
2008	2,694	1,373		
2009	2,222	1,257		
2010	2,034	1,087		
2011	1,991	1,041		
2012	1,863	972		
2013	1,661	880		
2014	1,802	828		
2015	1,788	926		

Fill in table above for each of these functions: $(M+F)(t)$ and $(M-F)(t)$.

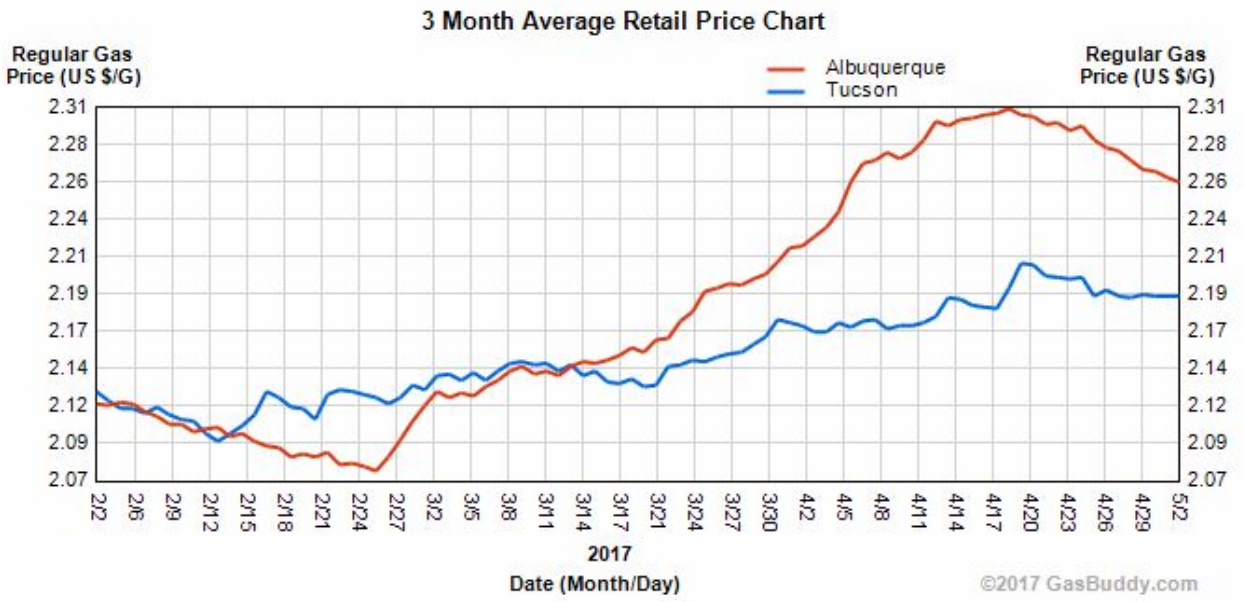
Describe what each of these two functions tells you in practical terms.

$(M+F)(t)$

$(M-F)(t)$

Is the function $(M+F)(t)$ increasing or decreasing? What does this tell you?

4. The following graph shows the average retail price of regular gasoline in Tucson and Albuquerque over the 3 month period. Suppose $T(d)$ represents the price of gas in Tucson as a function of the day, and $A(d)$ represents the price of gas in Albuquerque as a function of the day. (Data source: gasbuddy.com)



Note: Refer to the online version for colors. It's important to know which line corresponds to each city.

For which dates is the function $(T - A)(d)$:

Positive?

Negative?

Zero?

What do each of these answers tell us about the price of gas in Tucson and Albuquerque?