Directions:
Please only put your final, well written solutions, in the space provided.
Give exact answers (simplified radicals or fractions).
If you use additional paper clearly label the question and upload pages after the question page.
Use complete sentences and explain your reason as much as possible.
There are 4 questions and 40 points total

Name: _____

1. (a) [2 points] Suppose that we are considering two functions, $f(x)$ and $T(x)$. Provide the definition (and state the correct name) for the expression:$(f \circ T)(x)$

   (b) Let $f(x) = x^2 - 3$ and $T(x) = \sqrt{x + 12}$. Show all work and answer each question below.

      i. [1 point] Evaluate $(f \circ T)(4)$.

      i. _____

      ii. [1 point] Evaluate $(T \circ f)(4)$.

      ii. _____

      iii. [2 points] What is $(f \circ T)(x)$?

      iii. _____

      iv. [2 points] What is $(T \circ f)(x)$?

      iv. _____

      v. [2 points]

2. For each part below, consider the functions $f(x) = x^2 - 16$, $g(x) = \dfrac{1}{x-4}$, and $h(x) = \dfrac{1}{x}$.

(a) [3 points] Evaluate and simplify $A(x) = \left(\dfrac{f}{g}\right)(x)$.

(a) —————————

(b) [2 points] Evaluate and simplify $B(x) = (g+h)(x)$

(b) —————————

(c) [2 points] Evaluate and simplify $C(x) = (g \circ h)(x)$

(c) —————————

(d) For each of the new functions, $A(x)$, $B(x)$, and $C(x)$, what is the domain of each function?
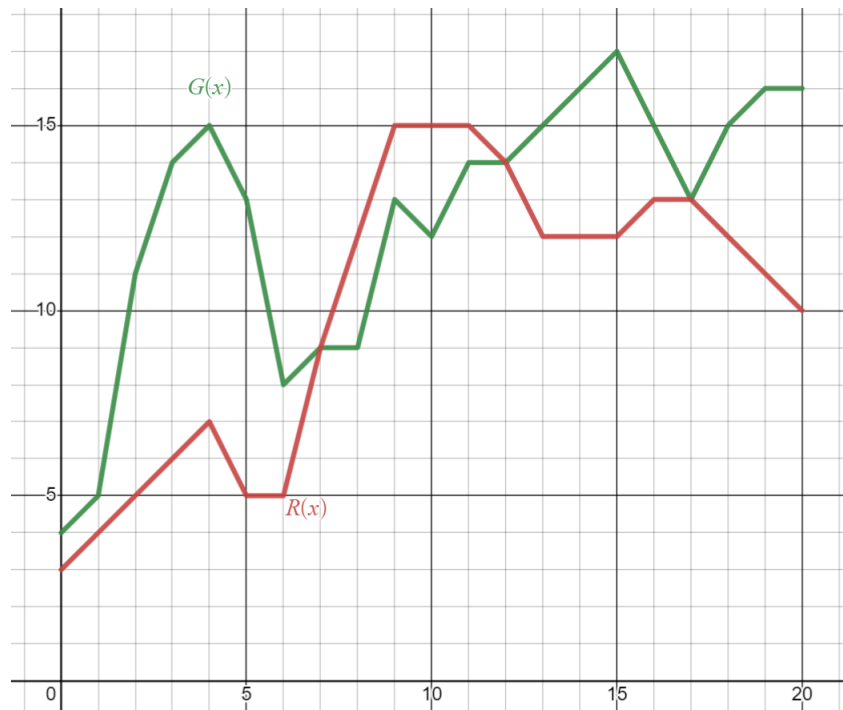
   i. [1 point] Domain of $A(x)$:

i. —————————

   ii. [1 point] Domain of $B(x)$:

ii. —————————

   iii. [1 point] Domain of $C(x)$:

iii. —————————

3. Use the graph of $R(x)$ and $G(x)$ below to answer the questions. Please use *interval* notation where appropriate.

(a) [1 point] What is the range of $G(x)$?

(a) _____

(b) [1 point] What is the range of $R(x)$?

(b) _____

(c) [1 point] Where is $R(x)$ increasing?

(c) _____

(d) [1 point] Where is $G(x)$ constant?

(d) _____

(e) [2 points] Where is $(R - G)(x)$ positive?

(e) _____

(f) [2 points] Where is $(R - G)(x)$ negative?

(f) _____

(g) [2 points] Where is $(R - G)(x)$ zero?

(g) _____

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

Year t	Male $M(t)$	Female $F(t)$	$(M+F)(t)$	$(M-F)(t)$
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		

(a) [2 points] Fill in the missing columns, $(M+F)(t)$ and $(M-F)(t)$.

(b) [1 point] Provide a practical description for what the $(M+F)(t)$ column means.

(c) [1 point] Provide a practical description for what the $(M-F)(t)$ column means.

(d) [1 point] Where is the function $(M+F)(t)$ increasing?

(d) _____

(e) [1 point] Where is the function $(M+F)(t)$ decreasing?

(e) _____

(f) [4 points] Provide a written interpretation of the function $(M+F)(t)$ based on your previous answers. Be detailed with your explanation.