NAME: _____ 02/24/23

MAT 1070 (Section 005)
TEST 2

DIRECTIONS: Make sure to read each problem carefully. Please show all work and circle or box your final answer. All answers should be written in simplest form and interval notation should be used where appropriate. NO CALCULATORS ALLOWED! The test is out of 100 points. You will have 50 minutes.

1. [10] Given $f(x) = \begin{cases} x^2 - x + 3 & x \leq -2 \\ x - 2 & -2 < x \leq 3 \\ -2 & x > 3 \end{cases}$

   a. [1] Find $f(5)$

   b. [3] Find $f(-1)$

   c. [3] Find $f(3)$

   d. [3] Find $f(-3)$

2. [10] Simplify the following:

   a. [4] $(2 + 5i) - (1 - 3i)$

   b. [6] $(-3 - 4i)^2$

3. [10] Solve the compound inequality and write the answer in interval notation. Then graph its solutions.

$$6x - 2 > 1 \quad \text{OR} \quad -3x + 1 \geq 4$$

4. [10] Given the functions $f(x) = 5x - 1$ and $g(x) = \sqrt{3 - x}$, find:

   a. [4] $(f + g)(2)$

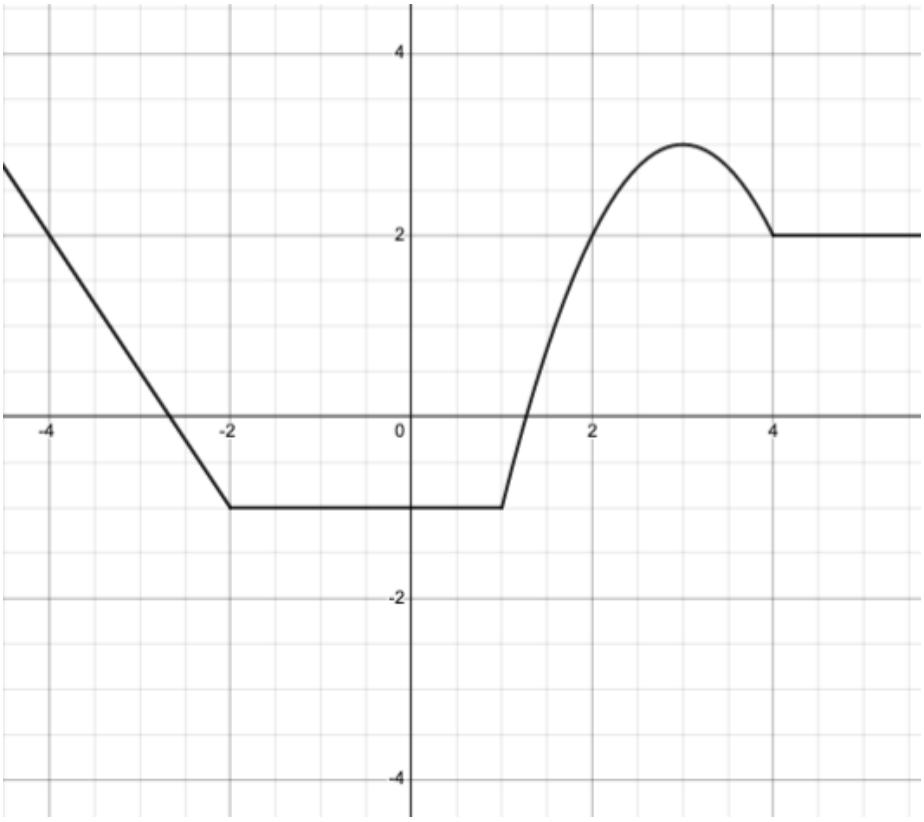
   b. [2] $\frac{f}{g}(x)$

   c. [4] Domain of $\frac{f}{g}(x)$

5. [10] Peter Parker can be paid one of two ways for his freelance photography job.
   Plan A pays $24 and $12 per photo
   Plan B pays $20 per photo
   For how many photos taken is Plan B better for Peter?

6. [10] Find and simplify the difference quotient for the function $f(x) = x^2 - 3x$

7. [10] Given the graph of a function below, identify the following:



a. [1] Intervals where the function is increasing

b. [2] Intervals where the function is decreasing

c. [2] Intervals where the function is constant

d. [2] Any relative maxima? If so, where?

e. [1] Domain of the function

f. [2] Range of the function

8. [10] Given $f(x) = 9 - 3x,\ g(x) = \sqrt{2x}$, $h(x) = \frac{1}{x}$, find:

   a. [4] $(f \circ g)(2)$

   b. [4] $(f \circ h)(x)$

   c. [2] Domain of $(f \circ h)(x)$

9. [10] A function $g(x)$ with the shape $y = x^2$ is reflected over the x-axis, shifted left 2 units and up 3 units.

   a. [6] Write the equation of $g(x)$

   b. [4] Sketch the graph of $g(x)$

10. [10] Using the graph $y = f(x)$ shown below, graph $g(x) = f(-x) - 2$