Quiz

Directions: Carefully read each question below and answer to the best of your ability in the space provided. You MUST show your work to receive full credit!

1. Consider the function

$$f(x) = x^2 - 4x - 7.$$

(a) (4 points) Find the average rate of change of $f(x)$ from $x = 0$ to $x = 5$.

Solution: The average rate of change of $f(x)$ from $x = x_1$ to $x = x_2$ is give by $\dfrac{f(x_2) - f(x_1)}{x_2 - x_1}$. We let $x_1 = 0$ and $x_2 = 5$ and evaluate

$$f(0) = (0)^2 - 4 \cdot (0) - 7 = -7$$

$$f(5) = (5)^2 - 4 \cdot (5) - 7 = 25 - 20 - 7 = -2$$

to get the required rate of change.

$$\frac{f(5) - f(0)}{5 - 0} = \frac{-2 - (-7)}{5} = \frac{5}{5} = 1.$$

(b) (6 points) Find a positive number A which is not equal to 1, so that the rate of change of $f(x)$ from $x = 1$ to $x = A$ is equal to 3.

Solution: We need to find $A \neq 1$ satisfies the following expression.

$$\frac{f(A) - f(1)}{A - 1} = 3.$$

First, let us evaluate

$$f(1) = 1^2 - 4 \times 1 - 7 = -10$$

and

$$f(A) = A^2 - 4A - 7.$$

We solve this equation for A as follows.

$$\frac{A^2 - 4A - 7 - (-10)}{A - 1} = 3; \quad A \neq 1$$

$$\frac{A^2 - 4A + 3}{A - 1} = 3; \quad A \neq 1$$

$$\frac{(A - 3)(A - 1)}{A - 1} = 3; \quad A \neq 1$$

$$A - 3 = 3 \implies A = 6$$

Name: _____

Section (circle one): 021 022 023 024

Question:	1	Total
Points:	10	10
Score:		