

Math 1161: Written Homework 1

Name: _____ .# _____

Due 5 September 2017 in recitation.

TA: _____ Time: _____

Instructions. You may discuss this assignment with others, but you must submit your own write-up. Write clearly and legibly. All functions herein are real-valued functions of a single real variable.

1. The graph of the **linear** function p_1 contains the points $(4, 0)$ and $(-2, 4)$.

(a) (2 pts) Write an expression for $p_1(x)$ of the form $mx + b$. Show your work.

(b) (2 pts) Write an expression for $p_1(x)$ of the form $a(x - c)$. Show your work.

2. For the items below, your polynomial expressions **do not** need to be in expanded and gathered form.

For example, the form $a(x - h)^2 + k$ is allowed for a quadratic polynomial (and, in fact, you can always write a quadratic polynomial in this form by completing the square).

(a) (2 pts) Give an example of a **quadratic** function q_1 such that the following are true:

- i. the graph of q_1 contains the point $(-6, 2)$, and
- ii. $q_1(x) > 0$ for all x .

(b) (2 pts) Give an example of a **polynomial** function q_2 with **degree 8** such that the following are true:

- i. the graph of q_2 contains the point $(9, -\frac{1}{2})$, and
- ii. $q_2(x) < 0$ for all x .

3. (12 pts) Let p be a linear function such that $p(2) = 0$ and $p(3) = -4$. Let q be a continuous function with domain $(-\infty, \infty)$ such that $q(2) = 7$ and $q(x) > 0$ for all x . Consider the function f defined by

$$f(x) = \frac{p(x)q(x)}{x^2 - 5x + 6}.$$

- (a) Determine an **equation** for each vertical asymptote of f . Show your work, which should include evaluating an appropriate limit.

- (b) Determine the **xy-coordinates** of each removable discontinuity of the graph of f . (Informally, a removable discontinuity is a 'hole' in the graph of f .) Show your work, which should include evaluating an appropriate limit.