

**Math 1161: Written Homework 1**

Name: \_\_\_\_\_ .# \_\_\_\_\_

Due Tuesday, September 4, 2018 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  $(3, 3)$  and  $(6, 0)$ .

(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. Let  $g(x) = x^2 + 3$ .

(a) (2 pts) Simplify  $g(x) + g(x)$ .

(b) (2 pts) Simplify  $g(x)g(x)$ .

(c) (2 pts) Simplify the composition  $g(g(x))$ .

(d) (2 pts) What **degree** do you expect  $g(g(g(g(x))))$  to have? You do not need to compute the polynomial explicitly.

3. Let  $p$  be a linear function such that  $p(2) = 10$  and  $p(-3) = 0$ . Let  $q$  be a continuous function with domain  $(-\infty, \infty)$  such that  $q(-3) = 4$  and  $q(x) > 0$  for all  $x$ . Consider the function  $f$  defined by

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

- (a) (4 pts) Determine an **equation** for each vertical asymptote of  $f$ . Show your work, which should include evaluating an appropriate limit.

- (b) (4 pts) 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.