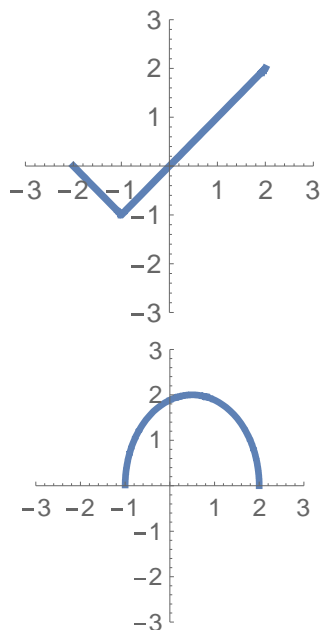# Math 241 Worksheet 1 (two-sided)

Name: _____   Section (circle one):   **3**   **4**

1. Pre-calculus review. For the following functions given by their graphs, what are the domain, range, and describe the increasing/decreasing behavior of the function. Assume the function does not go beyond what is shown. Assume any endpoints of curves are closed endpoints.

2. Pre-calculus review. For the following functions given by their formulas, what are their domains? Your concerns are zero denominators and even roots of negative numbers

(a) $f(x) = \frac{x-2}{(x^2+5)(3x-4)}$

(b) $g(x) = \sqrt[3]{x-12}$

(c) $h(x) = \frac{17}{\sqrt{x-4}}$

3. More pre-calculus. Algebra practice:

(a) Expand $(5x-3)^2$

(b) Simplify by factoring, if possible: $\frac{x^2-4}{x^2+5x+6}$

(c) Simplify by factoring, if possible: $\frac{x^2+4}{x^2-4}$

4. Finally, calculus...   Let $f(x) = x^2 + 3x$.

(a) Find the average rate of change of f over the following time intervals. Simplify your answers.

[1,3]

[1,2]

[1, 1.1]

[1, 1+h]

(b) Using the last answer from (a), what is the "instantaneous" rate of change of of f at 1? This is the number that the average rate of change over [1, 1+h] approaches as h approaches 0.

(c) The answer to (b) may also be interpreted as the <u>slope</u> of the tangent line to the graph of $y = x^2 + 3x$ at the point at $x_0 = 1$. Write an equation of this tangent line.