

# Homework I First-Half

Due in class May 30 2017

0. Read The Following Sections:

Chapter 4. Functions of One Variable: Section 4.1 Introduction, 4.2 Basic Definition, 4.3 Graphs of Functions.

Chapter 5. Properties of Functions: Section 5.3 Inverse Functions

Chapter 6. Differentiation: Section 6.5 A Dash of Limits, 6.4 Rates of Change

1. Consider the function  $f(x) = \frac{x}{x^2-1}$ 
  - (a). What is the domain of  $f$ ?
  - (b). Show that  $f(-x) = -f(x)$
2. Find the Domain and Range of the following functions:
  - (a).  $g(x) = 1 - \sqrt{x+2}$
  - (b).  $f(x) = \frac{x-1}{x-2}$
3.  $f(x) = \frac{1}{x+1}$ 
  - (a). Show that  $f$  is a one-to-one function.
  - (b). Find the inverse function  $g$  of  $f$ . What's the domain and range of the function  $g$ ?
4. If  $f$  is the function that tells you how many kilograms of carrots you can buy for a specified amount of money, then what does  $f^{-1}$  tell you?
5.  $f(x) = x^3 + 2x$ . Show that  $f$  is a strictly increasing function by definition.

6. Find the limit:

$$\lim_{x \rightarrow 3} \frac{x^2 - 2x - 15}{x - 5}$$

7. Find the limit:

$$\lim_{x \rightarrow 5} \frac{x^2 - 2x - 15}{x - 5}$$

8. Find the limit:

$$\lim_{x \rightarrow +\infty} (\sqrt{x+1} - \sqrt{x})$$