

# Worksheet 1

Fall 2016

MATH 221, Week 1

Name: \_\_\_\_\_

## 1

Factor the following:

$$x^2 - y^2$$

$$x^3 - y^3$$

$$x^4 - y^4$$

$$x^n - y^n$$

(Hint: if you plug in a number  $a$  to a polynomial in  $x$ ,  $p(x)$ , and get 0, you can factor  $x - a$  out of the polynomial. For example  $p(x) = x^3 - 2x + 1$ ,  $a = 1$ .  $p(1) = 1 - 2 + 1 = 0$ , so we know we can factor  $p(x) = (x - 1)q(x)$ , and we just need to figure out what  $q(x)$  is. In this case it's  $x^3 - 2x + 1 = (x - 1)(x^2 + x - 1)$ )

## 2 Approximating Derivatives

- (a) Find an equation for the line passing through  $(576, 432)$  and having slope 190392.

(b) Find the secant line to the graph  $f(x) = x^3$  determined by the points  $(1, 1)$  and  $(x_0, x_0^3)$ . It may be useful to use the previous part when computing the slope. (What should  $y$  be?)

(c) Based on the previous part, what would you guess the derivative of  $x^3$  is at the point  $x = 1$ ? Explain your answer.

### 3 Average Speed

Ariella drove 40 miles to see her cousin. The trip took her 2 hours. Then, Ariella left her cousin's house and drove another 30 miles to the store. It took Ariella 3 hours to arrive at the store. What was Ariella's average speed for the trip?

### 4 To think about

Suppose you are traveling on a highway with a speed limit of 60 mph. You travel down this highway for two hours and go 150 miles. A police officer somehow happens upon this information. Could he write you a ticket for speeding? Why or why not?