

# Discussion Problems for Math 180

Thursday, April 2, 2015

*Review – take no more than five minutes per question.*

1. Consider the equation

$$x^2 + y^2 - 2x + 6y - 6 = 0.$$

The graph of this equation is a circle. Where is this circle's center, and what is its radius?

2. Factor  $x^4 - 16$  completely.

3. Demonstrate that the derivative of  $\sqrt{x}$  is  $\frac{1}{2\sqrt{x}}$  directly from the definition.

*This time*

4. Evaluate the following limits:

(a) [Briggs and Cochran, 4.7.28]  $\lim_{x \rightarrow 0} \frac{\sin(x) - x}{7x^3}$

(b) [Briggs and Cochran, 4.7.29]  $\lim_{x \rightarrow \infty} \frac{e^{1/x} - 1}{1/x}$

(c) [Briggs and Cochran, 4.7.44]  $\lim_{x \rightarrow \pi/2} \frac{2 \tan(x)}{\sec^2 x}$

5. Rearrange these expressions so that you can use l'Hôpital's rule to determine the limits, and then determine the limits.

(a) [Briggs and Cochran, 4.7.50]  $\lim_{x \rightarrow 0^+} (\sin x) \sqrt{\frac{1-x}{x}}$

(b) [Briggs and Cochran, 4.7.54]  $\lim_{x \rightarrow \infty} x - \sqrt{x^2 + 4x}$

(c) [Briggs and Cochran, 4.7.55]  $\lim_{x \rightarrow 0^+} x^{2x}$

6. If  $x(0) = 6$  and  $x'(0) = -12$ , estimate  $x(0.1)$ .