Sols

MATH 141: QUIZ 4 SECTIONS 2.6 AND 3.1

ANN CLIFTON
UNIVERSITY OF SOUTH CAROLINA

Name and Section: _____

No phone or calculator. You must show all work to receive full credit. Simplify your coefficients when applicable.

1. **(2 points each)** Find the following limits.

(a) $\lim_{x\to 8^+} \dfrac{2x}{8-x}$

$\lim_{x\to 8^+} 2x = 16$ As $x \to 8^+$, $8-x$ gets very small and remains negative

2 So, $\lim_{x\to 8^+} \dfrac{2x}{8-x} = -\infty$

(b) $\lim_{x\to\infty} \dfrac{9x^4+x}{2x^4+5x^2-x+6}$

Same degree in numerator as denominator

2 $\lim_{x\to\infty} \dfrac{9x^4+x}{2x^4+5x^2-x+6} = \dfrac{9}{2}$

Date: September 27, 2017.

2. **(6 points)** Find an equation for the tangent to the curve at the given point using the limit definition.

$$y = 2\sqrt{x} \quad \text{at} \quad (1, 2)$$

$$m = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h} \quad , \; x = 1 \; , \; f(x) = 2\sqrt{x}$$

$$= \lim_{h \to 0} \frac{2\sqrt{1+h} - 2\sqrt{1}}{h}$$

$$= \lim_{h \to 0} \frac{2\sqrt{1+h} - 2}{h} \cdot \frac{2\sqrt{1+h} + 2}{2\sqrt{1+h} + 2}$$

$$= \lim_{h \to 0} \frac{4(1+h) - 4}{h(2\sqrt{1+h} + 2)}$$

$$= \lim_{h \to 0} \frac{4k}{k(2\sqrt{1+h} + 2)}$$

$$= \lim_{h \to 0} \frac{4}{2\sqrt{1+h} + 2}$$

$$= \frac{4}{2\sqrt{1} + 2} = \frac{4}{4} = 1$$

$$y - y_1 = m(x - x_1)$$

$$y - 2 = 1(x - 1)$$

$$y - 2 = x - 1$$

$$y = x + 1$$