MATH 251
WORKSHEET #6

Quiz #5 covers sections 4.1 (Related rates, see worksheet #5), 4.8 (Taylor polynomials), 4.9 (Indeterminate forms), 5.1 (Sums and sigma notation).

1. Calculate the Taylor polynomial of degree 3 for the following functions:

$$\text{(a) } f(x) = \frac{1}{x} \quad \text{about } x = 1,$$

$$\text{(b) } f(x) = x^5 - x^4 + 2x^3 + 6x - 1 \quad \text{about } x = 0.$$

2. Find the following limits:

$$\text{(a) } \lim_{x\to 0} \frac{3^x - 1}{x}, \qquad \text{(b) } \lim_{x\to 1^-} \frac{\arccos x}{\sqrt{1-x}}, \qquad \text{(c) } \lim_{x\to \pi/2} \frac{\sin t}{t},$$

$$\text{(d) } \lim_{x\to 1} x^{\frac{1}{x-1}}, \qquad \text{(e) } \lim_{x\to -\infty} \frac{2x + \sin(3x)}{x - \pi}.$$

3. Write the following sums using sigma notation:

(a) $5+6+7+8+9$, (b) $1-x+x^2-x^3+\ldots-x^{49}+x^{50}$, (c) $\frac{1}{2}+\frac{2}{4}+\frac{3}{8}+\ldots+\frac{n}{2^n}$.

4. Evaluate

$$\text{(a) } \sum_{j=0}^{8}(2^{j+1} - 2j), \qquad \text{(b) } \sum_{j=1}^{50} \frac{1}{j(j+1)}.$$