

Fall 2009 Math 151

Week in Review III

courtesy: David J. Manuel

(covering 2.3, 2.5, 2.6)

1 Section 2.3

1. Use the properties of limits to compute $\lim_{x \rightarrow 5} x^2 - 4x + 3$.

2. Compute $\lim_{x \rightarrow -1} \frac{x^2 + 6x + 5}{x^2 - 3x - 4}$.

3. Compute $\lim_{x \rightarrow 9} \frac{\sqrt{x} - 3}{9 - x}$.

4. Compute $\lim_{h \rightarrow 0} \frac{\frac{2}{x+h} - \frac{2}{x}}{h}$.

5. Compute $\lim_{t \rightarrow 1} \mathbf{r}(t)$, where $\mathbf{r}(t) = \left(\frac{t^2 + 2t}{t + 1} \right) \mathbf{i} + \left(\frac{t^4 - 1}{t - 1} \right) \mathbf{j}$

6. Compute $\lim_{x \rightarrow 0} x^4 \cos\left(\frac{1}{x}\right)$

7. Given $3x + 2 \leq f(x) \leq x^3 + 4$ when $x \geq -2$, compute $\lim_{x \rightarrow 1} f(x)$.

2 Section 2.5

1. "Left and Right Limits and Continuity..." Maplets located at <http://calclab.math.tamu.edu/maple/maplets> (only works on OAL machine, Calclab machine, or any machine with Maple installed on it)

2. Find the values for which $f(x) = \frac{x^2 - 9}{x^2 - 5x + 6}$ is not continuous. Determine which, if any, of these discontinuities are removable.

3. Determine whether the function

$$f(x) = \begin{cases} \frac{x^2 - 9}{x - 3} & \text{if } x \neq 3 \\ 1 & \text{if } x = 3 \end{cases}$$

is continuous at $x = 3$ or not and why.

4. Find the value of k that makes

$$f(x) = \begin{cases} kx^2 & \text{if } x \leq 3 \\ 2x + k & \text{if } x > 3 \end{cases}$$

continuous at $x = 3$.

5. Compute $\lim_{x \rightarrow 2} \cos\left(\frac{x-2}{x^2-4}\pi\right)$.

6. Prove that there is at least one real solution to the equation $x^4 + x = 5$. Find an interval of length 1 which contains a solution.

3 Section 2.6

1. Compute $\lim_{x \rightarrow \infty} \frac{5x^2 + 7}{3x^2 - x}$.

2. Compute $\lim_{x \rightarrow -\infty} \frac{x - 2}{x^2 + 2x + 1}$.

3. Compute $\lim_{x \rightarrow \infty} \sqrt{x^2 + 7x} - x$.

4. Find the horizontal asymptotes of $f(x) = \frac{\sqrt{x^2 + 2}}{3x - 6}$.