Fall 2004 MATH 171

Week in Review III

courtesy of David J. Manuel

Section 2.6 and 2.5

Section 2.6

1. Use the definition to prove that $\lim_{x\to -\infty} \frac{1}{x^2} = 0$.

2. Use the definition to prove that $\lim_{x\to\infty} \frac{2x}{x+1} = 2$.

3. Use the definition to prove that $\lim_{x\to\infty} \sqrt{x} = \infty$

4. Prove $\lim_{x\to\infty} \frac{\cos x}{x} = 0$.

5. If $\lim_{x\to\infty} f(x) = L_1$ and $\lim_{x\to\infty} g(x) = L_2$, prove $\lim_{x\to\infty} (f(x) - g(x)) = L_1 - L_2$.

Section 2.5

6. Use the definition of continuity to determine whether $f(x) = \begin{cases} \dfrac{x^2 - x - 2}{x+1} & \text{if } x \neq -1 \\ 1 & \text{if } x = -1 \end{cases}$ is continuous at $x = -1$ or not.

7. Use the definition of continuity and properties of limits to determine whether $f(x) = x^3 - x + 1$ is continuous at $x = 2$ or not.

8. If f is continuous at $x = a$ and g is continuous at $x = a$, prove that fg is continuous at $x = a$.

9. Prove $\sqrt{3}$ exists by proving that there exists a real number c such that $c^2 = 3$.