Chapter 2 (Unit 1) Review

- IVT
- $\lim_{x \to 0} \frac{\sin x}{x} = 1$
- Piecewise
- Continuity, Discontinuity
- Limits: numerically, graphically, & analytically
- Infinite limits (including HA and VA)
- Average Rate of Change, Instantaneous Rate of Change

1. a. Use your graphing calculator and the Intermediate Value Theorem to show that the function $f(x) = x^3 + x^2 - 2x + 3$ has a c in the interval [1,2] such that f(c)=5.

b. How could using IVT fail?

2. Use a graphing utility to find $\lim_{x \to 0} \left(\frac{\sin 2x}{3x} \right)$. Then, find the limit analytically.

3. Sketch the graph of the following function. Using the definition of continuity, find the x-values for which f is not continuous.

$$f(x) = \begin{cases} x^2 + 2 & x \leq 1 \\ 3x - 5 & x > 1 \end{cases}$$

4. Find the discontinuities for $f(x)$. Label them as removable or nonremovable. Sketch a graph of the function.

$$f(x) = \frac{x+2}{x^3 + 2x^2}$$

5. Find $\lim_{x \to 3} \frac{x^2 - 9}{x - 3}$

a) graphically **b)** numerically **c)** analytically

6. At what values of x is $f(x) = \frac{x-2}{x^2 - x - 2}$ discontinuous?

7. Find: **a)** $\lim_{x \to 2^-} \frac{x-1}{x-2}$

b) $\lim_{x \to 3^+} \frac{5}{x-3}$

8. Find: **a)** $\lim_{x \to \pi} \tan x$

b) $\lim_{x \to \pi} \sec x$

c) $\lim_{x \to \frac{\pi}{2}} \csc x$

9. Study your quiz, your homework, and your notes. Remember, you need to show work or write words to explain each problem for the test—even the multiple-choice questions. There are non-calculator and calculator problems on the test. When you finish the calculator questions, you will receive the non-calculator part. You must budget your time yourself. You will have the whole period to work on it.