2.3 Day 2 (8/21)

AP Calculus BC   Name_____
Continuous Functions

A function $f(x)$ is continuous at $x = c$ only when the following conditions hold:
    i) $f(c)$ exists
    ii) $\lim\limits_{x \to c} f(x)$ exists
    iii) $\lim\limits_{x \to c} f(x) = f(c)$

Determine whether each function is continuous at the given number. If it is not, tell why.

1. $f(x) = \begin{cases} x & 0 \le x < 1 \\ 2-x & x \ge 1 \end{cases}$ at $x = 1$
        2. $f(x) = \begin{cases} x^2 & 0 \le x < 2 \\ 4 & x > 2 \end{cases}$ at $x = 2$

1. $f(1) = 2-1 = 1$

2. $\lim\limits_{x \to 1^-} f(x) = 1$ $\lim\limits_{x \to 1^+} f(x) = 1$

    $\lim\limits_{x \to 1} f(x) = 1$

3. $\lim\limits_{x \to 1} f(x) = f(1)$ f is continous @ x=1 since $\lim\limits_{x \to} f(x) = f(1)$.

1. $f(2) = $ dne

f is discontinuous @ x=2
b\c $f(2)$ dne.

3. $f(x) = \begin{cases} x^3 & x < 2 \\ 2x+5 & x \ge 2 \end{cases}$ at $x = 2$
        4. $f(x) = \begin{cases} \sqrt{x} & 0 \le x < 9 \\ 2x-15 & x \ge 9 \end{cases}$ at $x = 9$

1. $f(2) = 2(2)+5 = 9$

2. $\lim\limits_{x \to 2^-} f(x) = 8$ $\lim\limits_{x \to 2^+} f(x) = 9$

f is disc. @ x=2 b\c
$\lim\limits_{x \to 2} f(x) = $ dne.

5. $f(x) = \dfrac{x+1}{x+5}$

1. $f(9) = 2(9)-15 = 3$

2. $\lim\limits_{x \to 9^-} f(x) = 3$ $\lim\limits_{x \to 9^+} f(x) = 3$

    $\lim\limits_{x \to 9} f(x) = 3$

3. $\lim\limits_{x \to 9} f(x) = f(9)$ f is cont b\c $\lim\limits_{x \to 9} f(x) = f(9)$

6. $f(x) = \dfrac{(x+1)(x+5)}{(x+5)}$