Notes 41 **Name _____**

Limits and Continuity (11.3)

Continuity

A function *f* is continuous at point *a* if:

I. $f(a)$ exists

II. $\lim_{x\to a} f(x)$ exists

III. $\lim_{x\to a} f(x) = f(a)$

Determining Whether a Functions is Continuous at a Number: Use the **definition of continuity** to determine whether f is continuous at a.

1) $f(x) = \dfrac{x+7}{x-7}$

a. $a = 7$

b. $a = -7$

2) $f(x) = \begin{cases} x-4 & \text{if } x \le 4 \\ x^2 + x - 4 & \text{if } x > 4 \end{cases}$

a. $a = 0$

b. $a = 4$

3) $f(x) = \dfrac{x^2 + 8x}{x^2 - 8x}$

a. $a = 0$

b. $a = 8$

4) $f(x) = \begin{cases} 2-x & \text{if } x < 1 \\ 1 & \text{if } x = 1 \\ x^2 & \text{if } x > 1 \end{cases}$

a. $a = 1$

b. $a = 7$

Determining Where a Function is Discontinuous: Determine for what numbers, if any, the given function is discontinuous.

5) $f(x)=\dfrac{x+2}{x^2-3x-10}$

6) $f(x)=\begin{cases}\dfrac{x^2-9}{x-3} & \text{if } x\neq 3\\ 6 & \text{if } x=3\end{cases}$

7) $f(x)=\dfrac{x-5}{x^2-5x}$

8) $f(x)=\begin{cases}x-2 & \text{if } x\leq 2\\ x^2-1 & \text{if } x>2\end{cases}$

9) $f(x)=\dfrac{1-\cos x}{x}$

10) $f(x)=\begin{cases}7x & \text{if } x<6\\ 41 & \text{if } x=6\\ x^2+6 & \text{if } x>6\end{cases}$

Find the constant c that makes $f(x)$ continuous on $(-\infty,\infty)$.

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