## MATH 141: Quiz 3

Name: \_\_\_\_\_

Directions:

- \* Show your thought process (commonly said as "show your work") when solving each problem for full credit.
- \* If you do not know how to solve a problem, try your best and/or explain in English what you would do.
- \* Good luck!
- 1. A function f(x) is continuous at x = -3. Using the mathematical definition of continuity, state the three conditions that must be true.

(1) 
$$f(-3)$$
 is Judined  
(2)  $\lim_{x \to -3} f(x) = e_{x,i} + s_{x,j}$ 

$$(3) \lim_{x \to -3} f(x) = f(-3)$$

2. Using the definition of continuity, determine whether the following function is continuous at *x* = 0:

$$f(x) = \begin{cases} (x-1)^2 & x > 0 \\ 0 & x = 0 \\ (x+1)^2 & x < 0 \end{cases}$$

$$(1) \quad \int (0) = 0 \quad \checkmark$$

$$\lim_{|x| \to 0^+} \int (x) = \lim_{|x| \to 0^+} (x-i)^2 = \left(\lim_{|x| \to 0^+} x - \lim_{|x| \to 0^+} 1\right)^2 = (0-i)^2 = 1$$

$$\lim_{|x| \to 0^+} \int (x) = \lim_{|x| \to 0^-} (x+i)^2 = \left(\lim_{|x| \to 0^+} x + \lim_{|x| \to 0^-} 1\right)^2 = (0+i)^2 = 1$$

$$\lim_{|x| \to 0^-} \int (x) = 1 \quad \checkmark$$

$$\lim_{|x| \to 0^-} \int (x) = 1 \quad \checkmark$$

$$(3) \quad \lim_{|x| \to 0^-} \int (x) = 1 \neq 0 - \int (0)$$

$$(5) \quad \lim_{|x| \to 0^-} (x+i)^2 = 1$$

3. State in interval notation where this function is continuous:

$$f(x) = \frac{\sin(x^{2}+1)}{2x^{2}-5x+2} \sqrt{2x-2}$$
Find domain:  
(1) Problems:  
(a) chinision by (0,  
 $2x^{2}-5x+2=0$   
 $(2x-1)(x-2)=0$   
 $2x-1=0$   $x-2=0$   
 $2x-1=0$   $x-2=0$   
 $\sqrt{x}=\frac{1}{2}, x=2$   
(b) Squar not of negative.  
 $2x - 2 < 0$   
 $x < 1$   
(2) Remove problems from  $lR$   
 $\frac{2}{\sqrt{x}-\sqrt{x}}$   
Domain:  $[1,2) \cup (2,\infty)$   
Because this function is continuous on its domain,  
 $f(x)$  is continuous on  $[1,2) \cup (2,\infty)$ .