UMass Boston - Math 140 - Summer 2007 **Guest Student**

WeBWorK assignment 02-Continuity

Due: 07/26/2007 at 10:00pm EDT

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1. (1 pt) The function f is given by the formula

$$f(x) = \frac{4x^3 + 8x^2 + 9x + 18}{x + 2}$$

when $x < -2$ and by the formula

$$f(x) = 5x^2 - 5x + a$$

when $-2 \leq x$.

What value must be chosen for a in order to make this function continuous at -2?

a = ______________

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2. (1 pt) For what value of the constant c is the function f continuous on $(-\infty, \infty)$ where

$$f(y) = \begin{cases} cy + 3 & \text{if } y \in (-\infty, 2] \\ cy^2 - 3 & \text{if } y \in (2, \infty) \end{cases}$$

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3. (1 pt)

A function $f(x)$ is said to have a **removable** discontinuity at $x = a$ if:

1. f is either not defined or not continuous at $x = a$.

2. $f(a)$ could either be defined or redefined so that the new function IS continuous at $x = a$.

Let $f(x) = \frac{2x^2 + 4x - 70}{x - 5}$

Show that $f(x)$ has a removable discontinuity at $x = 5$ and determine what value for $f(5)$ would make $f(x)$ continuous at $x = 5$.

Must define $f(5) =$_______.

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4. (1 pt)

A function $f(x)$ is said to have a **jump** discontinuity at $x = a$ if:

1. $\lim_{x \to a^-} f(x)$ exists.

2. $\lim_{x \to a^+} f(x)$ exists.

3. The left and right limits are not equal.

Let $f(x) = \begin{cases} 8x - 7, & \text{if } x < 9 \\ \frac{3}{x+5}, & \text{if } x \geq 9 \end{cases}$

Show that $f(x)$ has a jump discontinuity at $x = 9$ by calculating the limits from the left and right at $x = 9$.

$\lim_{x \to 9^-} f(x) =$_______

$\lim_{x \to 9^+} f(x) =$_______

Now for fun, try to graph $f(x)$.

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5. (1 pt) Find c such that the function

$$f(x) = \begin{cases} x^2 - 7, & x \leq c \\ 8x - 23, & x > c \end{cases}$$

is continuous everywhere.

$c =$ _______