Homework 8.3 – Rolle's Theorem and the Mean Value Theorem

1. (1 pt) alfredLibrary/AUCI/chapter8/lesson3/MVT3pet.pg

Consider the function $f(x) = 4x^3 - 4x$ on the interval $[-5,5]$. Find the average or mean slope of the function on this interval:

$$\frac{f(5)-f(-5)}{5-(-5)} = \_\_\_\_\_$$

By the Mean Value Theorem, we know there exists at least one c in the open interval $(-5,5)$ such that $f'(c)$ is equal to this average slope. For this problem, there are two values of c that work.

The smaller one is $c =$ _____,

and the larger one is $c =$ _____.

2. (1 pt) alfredLibrary/AUCI/chapter8/lesson3/quiz/MVT2pet.pg

Consider the function $f(x) = \frac{1}{x}$ on the interval $[3,9]$. Find the average or mean slope of the function on this interval:

$$\frac{f(9)-f(3)}{9-(3)} = \_\_\_\_\_$$

By the Mean Value Theorem, we know there exists a c in the open interval $(3,9)$ such that $f'(c)$ is equal to this average slope. For this problem, there is only one c that works. Find it.

$c =$ _____

3. (1 pt) alfredLibrary/AUCI/chapter8/lesson3/continuity1pet.pg

For each function, decide whether it is continuous on the given closed interval by answering "y" for yes or "n" for no. Note that you only have 2 attempts for this problem.

(a) $f(x) = x^3 - x^2 + x$ on $[1,10]$: _____

(b) $f(x) = \frac{x-1}{x-2}$ on $[-3,1]$: _____

(c) $f(x) = \frac{x+1}{x+3}$ on $[-3,5]$: _____

(d) $f(x) = |x^2 - 4|$ on $[0,4]$: _____

4. (1 pt) alfredLibrary/AUCI/chapter8/lesson3/diff1pet.pg

For each function, decide whether it is differentiable on the given closed interval by answering "y" for yes or "n" for no. Note that you only have 2 attempts for this problem.

(a) $f(x) = x^3 - x^2 + x$ on $[1,10]$: _____

(b) $f(x) = \frac{x-1}{x-2}$ on $[-3,1]$: _____

(c) $f(x) = \frac{x+1}{x+3}$ on $[-3,5]$: _____

(d) $f(x) = |x^2 - 4|$ on $[0,4]$: _____