A.P. Calculus
Copy original problem.
Convince *me* that **you** understand the concept!
No calculators, of course.

Name _____

Per _____ Date _____

Exam #2 Quarter #1 Chapters 1 – 4

I Find the value of *X* in the 4 situations (of 10) where the Intermediate Value Theorem can be properly applied. Note: ***X is an integer*** in each valid case. Explain your reasoning for the invalid cases.

(5 pts ea – total 50 pts)

A) $f(x) = x^3 - x^2 + x - 2 \; ; m = 4 \quad [0,3]$

B) $f(x) = x^2 - 6x + 8 \; ; m = 0 \quad [0,3]$

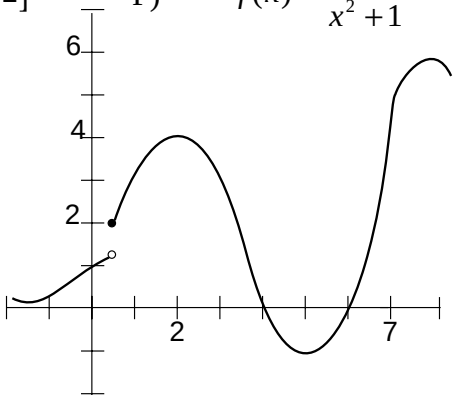
C) $f(x) = x^2 + x - 1 \; ; m = 11 \quad [0,5]$

D) $f(x) = \dfrac{x^2 + x}{x - 1} \; ; m = 1 \quad \left[\dfrac{5}{2}, 4\right]$

E) $f(x) = \dfrac{x^2 + 2x + 1}{x + 1} \; ; m = -\dfrac{1}{2} \quad [-2,2]$

F) $f(x) = \dfrac{x^2 - 1}{x^2 + 1} \; ; m = 2 \quad [0,3]$

G) See figure to the right. $f(x)$ is graphed.



1) $m = 2 \quad [-1,8]$

2) $m = 2 \quad [1,8]$

3) $m = 5 \quad [1,8]$

4) $m = 0 \quad [1,8]$

II Determine the values of the letters *b* and *c* so the function is continuous, if possible. (10 pts)

$$F(x) = \begin{cases} x^2 + bx + c & x \le 1 \\ x + 1 & 1 < x < 3 \\ x^2 + bx + c & x \ge 3 \end{cases}$$

III Using the definition of the derivative, find the derivative of *f*(*x*): (10 pts ea)

A) $f(x) = \dfrac{x+1}{x-1}$ B) $f(x) = \cos x$

IV Determine the following limits, if possible. Briefly explain your reasoning. (5 pts ea)

A) $\lim\limits_{x \to 0} \dfrac{\tan x}{x}$ B) $\lim\limits_{x \to -1} \dfrac{1 - |x|}{1 + x}$ C) $\lim\limits_{x \to 0} \dfrac{\left(1 - \cos^2 x\right)^2 + \sin^2 3x}{x^2}$ D) $\lim\limits_{x \to 0} \dfrac{\sin 2x}{\sin x}$

Extra Credit **5 pts**

Solve $\forall \; x \varepsilon \Re$: $\sqrt{5 + \sqrt{x}} = \sqrt{x} - 1$