Name_____ **Test #8**

Non-Calculator Portion (Honor system)

Show all work for full credit.

For problem 1, use the function, $f(x) = x^3 + x^2 - 8x - 12$.

1N. a) Find the critical number(s).

b) Determine increasing and decreasing intervals of *f(x)*.

Inc:_____

Dec:_____

c) Find all the x-values for relative extrema and classify as maximums or minimums.

d) Find the x-value for the point(s) of inflection.

e) Determine intervals of concavity for *f(x)*.

Conc. Up:_____

Conc. Down:_____

2N. $\lim_{x \to \infty} \frac{(2x-1)(3-x)}{(x-1)(x+3)}$

(A) -3
(B) -2
(C) 2
(D) 3
(E) nonexistent

3N.

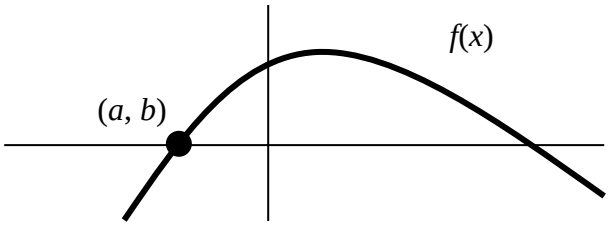
$$f(x)=\begin{cases}\dfrac{x^2-4}{x-2} & \text{if } x\neq 2\\ 1 & \text{if } x=2\end{cases}$$

Let f be the function defined above. Which of the following statements about f are true?

I. f has a limit at x = 2.
II. f is continuous at x = 2.
III. f is differentiable at x = 2.

(A) I only (B) II only (C) III only (D) I and II only (E) I, II, and III

4N.



Put in order form least to greatest: $f(a)$, $f'(a)$, $f''(a)$ _____ < _____ < _____

5N. A function *f* is continuous and differentiable on the interval [-4, 2], so that f, f', and f'' have properties as shown in the table below.

x	$-4 < x < 0$	0	$0 < x < 1$	1	$1 < x < 2$
$f(x)$	positive	0	negative	-2	negative
$f'(x)$	negative	-1	negative	0	positive
$f''(x)$	negative	0	positive	positive	positive

What are the *x*-coordinates of the **local maximum** and **local minimum** of *f* on the interval [-4. 2].

Name_____

Test #9
Calculator Portion

Show all work for full credit.

1C. Suppose $x = 8$ is a critical number for a function, *f*, with $f'(x) > 0$ for the interval [8, 9] and $f'(x) < 0$ for the interval [7, 8]. Then $x = 8$ is:

(a) a local maximum
(b) a local minimum
(c) not a local extremum

2C. Given that $f(x) = -x^2 + 12x - 34$ has a local maximum at $x = 6$, choose the correct statement.

a) f' is positive on the interval $(6, \infty)$.
b) f' is positive on the interval $(-\infty, \infty)$.
c) f' is negative on the interval $(6, \infty)$.
d) f' is negative on the interval $(-\infty, 6)$
e) None of these

3C. A dog heading due north at a constant speed of 2 meters per second trots past a fire hydrant at t = 0 seconds. Another dog heading due east at a constant speed of 3 meters per second runs by the hydrant at t = 1 second. At t = 9 seconds, the rate of change in the distance between the two dogs is

a) 3.2 m/sec b) 3.6 m/sec c) 4.0 m/sec d) 4.4 m/sec e) 4.8 m/sec

4C. The total cost of producing and marketing *x* number of units of a certain product is given by

$$C(x) = \frac{4 - 0.02x^2 + .0001x^3}{2}.$$

For what number *x* is the total cost a minimum? Round answer to nearest unit.

A) $x = 0$
B) $x = 100$
C) $x = 133$
D) $x = 167$

5C. Using calculus, show the work and find the global maximum value and the absolute minimum value of g on the interval [0,4]: $g(x) = \dfrac{x^2 - 4x + 4}{x + 2}$

6C. Use the Mean Value Theorem to find the values of c, where f '(c) is equal to the average rate of change of $f(x) = x - 2\sin x$ on the interval $[0, \pi]$.

a) c = 0 b) c = 1 c) c = $\dfrac{\pi}{3}$ d) c = $\dfrac{\pi}{2}$ e) None of these

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7C. A function f is continuous and differentiable on the interval [-4, 2], so that f, f', and f'' have properties as shown in the table below.

x	$-4 < x < 0$	0	$0 < x < 1$	1	$1 < x < 2$
$f(x)$	positive	0	negative	-2	negative
$f'(x)$	negative	-1	negative	0	positive
$f''(x)$	negative	0	positive	positive	positive

What are the x-coordinates of all **points of inflection** of f on the interval [-4, 2]?