

Calculus Test – Chapter 3

Name

Key

1 Find the absolute extrema of the function and the x-value in the closed interval for

$$y = \frac{x^2}{x^2 + 5} \quad [-2, 1]$$

$x = (0, 0)$ absolute min

$x = (-2, \frac{4}{9})$ absolute max

$0, \frac{\pi}{2}, \pi$

2. The Mean Value Theorem states: $f'(x) = \frac{f(b) - f(a)}{b - a}$ for some x in the interval. Find that value for $f(x) = \cos(2x)$ on the interval $[0, \pi]$

$x = 0$

3. Find the critical number ^(s) for $f(x) = \frac{x - 4}{x}$.

4. Given the function $f(x) = 3x^2 - 6x + 2$, find the intervals where it

$(-\infty, 1)$ decreases

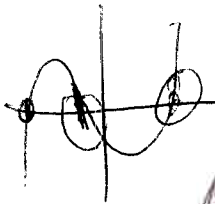
$(1, \infty)$ increases

5. Given the function $y = x\sqrt{4-x}$ find any

$x = \frac{8}{3}$. relative maxima

None . relative minima

None . points of inflection



$$\begin{array}{r} 3 \overline{) 21 - 19 - 9 \quad 9} \\ \underline{6 \quad 21 \quad 6 \quad 9} \\ 27 \quad 2 \quad -3 \quad 0 \\ -12 \quad 7 \quad 2 \quad -2 \\ \underline{-25 \quad -3 \quad 0} \end{array}$$

6. Given the function $y = 2x^4 + x^3 - 19x^2 - 9x + 9$

$x = -0.24$. relative maxima

$x = -2.26$ $x = 2.12$. relative minima

$x = 1.14$
 -1.396 . points of inflection

$$8x^3 + 3x^2 - 38x - 9$$

$$24x^2 + 9x - 38 = 0$$

7. 100 12. A manufacturer has determined that the total cost of C of operating a factory is

$$C = 0.5x^2 + 15x + 5000$$

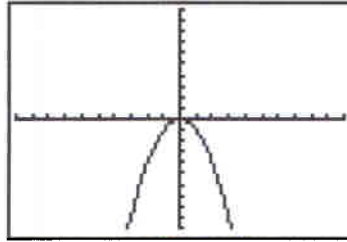
where x is the number of units produced. At what level of production will the average cost per unit be minimized? (The average cost per unit is C/x .)

6, 6 8. Find the length and width of a rectangle with the smallest perimeter whose area is 36.

$x = -3.32$
 $x = 3.32$ 9. Use Newton's method to approximate the zero's of the function $f(x) = x^4 - 10x^2 - 11$.

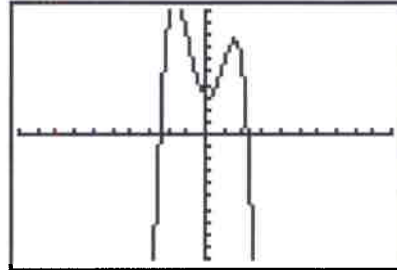
Concave downward

10. The graph of below is the graph of the second derivative.
Discuss the concavity of the original function.



11. In the following graph, if you know the $x = -1.8$, $x = .2$ and $x = 1.5$ are critical points
discuss the

$(-\infty, -1.8)$ $(.2, 1.5)$ increasing intervals
 $(-1.8, .2)$ $(1.5, \infty)$ and decreasing intervals.



12. Use the same graph from number 11.

2 How many points of inflection would you have?