

Math 1496 - Sample Test 2

1. If $f(x) = x^3 + x + 1$ find $(f^{-1})'(3)$.
2. Find the absolute minimum and maximum of the following on the given interval

(i) $f(x) = 1 - x^2$ on $[-2, 3]$

(ii) $f(x) = 2x^3 - 15x^2 + 24x$ on $[0, 3]$

3. State the Mean Value Theorem. Verify the Mean Value Theorem for the following

(i) $f(x) = x^3 - x$ on $[0, 2]$

(ii) $f(x) = \frac{x}{x+2}$ on $[1, 10]$

4. If $y = x(x - 4)^3$ calculate the following
 - (i) The critical numbers
 - (ii) When y is increasing and decreasing.
 - (iii) Determine whether any of the critical numbers are minimum or maximum.
 - (iv) When y is concave up and down and determine the points of inflection.
 - (v) Then sketch the curve.
5. A ladder 13 feet long is resting against the wall of a house. The base of the ladder is pulled away from the wall at a rate of 2 ft/sec. At what rate is the tip of the ladder moving down the wall when the base of the ladder is 5 ft away from the wall?
6. A paper cup in the shape of an inverted cone with height 10 cm and a base of radius 3 cm, is being filled at a rate of $2 \text{ cm}^3/\text{min}$. Find the rate of change in the height of the water when the height of the water is 5 cm.
7. A rancher has 200 feet of fencing with which to enclose two adjacent rectangular corals. What dimensions should be used so that the enclosed area will be a maximum?
8. A box with a square bottom is to be built that holds 24 cubic feet. Find the dimensions of the box that will minimize the surface area of the box.