

Name: _____

Date: _____

1. Find the extreme values for $f(x) = 2x^3 - 15x^2 + 36x$ on the interval $[1, 5]$ and determine where those values occur. (3 marks)

2. Find the extreme values for $f(x) = (x^2 - 2)^2$ on the interval $(-\infty, \infty)$ and determine where those values occur. (3 marks)

3. A rectangular plot of land is to be bounded by a fence on 3 sides and by the wall of a building on the fourth side. Find the dimensions of the field with maximum area if you have 200m of fencing. (4 marks)

4. Find the dimensions of a rectangle of maximum area that can be inscribed in a circle of radius 5. (4 marks)

5. Let $s = t^3 - 4t^2$. Find s and v when $a = 0$.

(3 marks)

6. Let $s = t^3 - 6t^2 + 9t + 1$ be the position function of a particle. Find the maximum speed of the particle during the time interval $0 \leq t \leq 5$.

(3 marks)

7. The position of a particle is given by $s = t^3 - 9t^2 + 24t$ for $t \geq 0$. Describe the motion of the particle (moving right, left, stopped, speeding up, slowing down) and make a sketch. (3 marks)

8. Approximate $\sqrt{5}$ to 4 decimal places by applying Newton's Method to the equation:
 $x^2 - 5 = 0$.

(3 marks)

9. The equation $x^3 + x - 1 = 0$ has one real solution. Approximate it to 4 decimal places using Newton's Method. (3 marks)

10. Verify that the Mean Value Theorem is satisfied for the function $f(x) = \sqrt{x - 1}$ on $[2, 5]$ and find all values c in that interval that satisfy the conclusion of the theorem. (3 marks)