

Name: _____

Date: _____

1. Find the extreme values for $f(x) = 2x^3 - 3x^2 - 12x$ on the interval $[-2,3]$ and determine where those values occur. (3 marks)

2. Find the extreme values for $f(x) = \begin{cases} 1 - x^2, & x < 0 \\ x^2 + 1, & x \geq 0 \end{cases}$ on the interval $[-2,1]$ and determine where those values occur. (3 marks)

3. A sheet of cardboard 18 inch square (18 inches by 18 inches) is used to make an open box by cutting squares of equal size from corners and folding up the sides. What size squares should be cut to obtain a box with largest possible volume? (4 marks)

4. Find values for x and y such that their product is a minimum if $y = 2x - 10$. (4 marks)

5. Let $s = 2t^3 - 12t^2 + 4t + 9$. Find s and v when $a = 0$. (3 marks)

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

7. The position of a particle is given by $s = t^3 - 5t^2 + 3t$ 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 $-\sqrt[3]{72}$ to 4 decimal places by applying Newton's Method to the equation $x^3 + 72 = 0$.

(3 marks)

9. The equation $x^3 + x^2 - 3x - 3 = 0$ has one real solution for $-2 < x < -1$. Approximate it to 4 decimal places using Newton's Method. (3 marks)

10. The velocity of a particle is given by the differentiable function $v(t)$ such that $v(0) = 2$ and $v(4) = 22$. Is there a time $t, 0 \leq t \leq 4$, such that $v'(t) = 5$? Justify your answer. (3 marks)