

AP Calculus**Quiz: Optimization and Rectilinear Motion**

1. Find the absolute maximum and absolute minimum values of

$$f(x) = x^3 + 3x^2 - 9x - 7 \quad \text{on } [-4, 2]$$

2. For what values of x does $f(x) = x^4 - 8x^2$ have a local minimum?

3. What are all the values of x for which the function $f(x) = x^3 + 6x^2 + 9x + 1$ is increasing?

4. For what values of x is the function $f(x) = 5 + 15x + 6x^2 - x^3$ decreasing?

5. A particle moves along the x -axis so that at any time t its position is given by $x(t) = (t + 1)(t - 3)^3$. For what values of t is the velocity of the particle increasing?

7. A particle moves along the x -axis in such a way that its position at time t is given by $x(t) = \frac{1-t}{1+t}$. What is the acceleration of the particle at time $t = 0$?