

AP Calc Derivative Review Problems

**1972 AB2/BC1**

A particle starts at time  $t = 0$  and moves on a number line so that its position at time  $t$  is given by  $x(t) = (t - 2)^3(t - 6)$ .

- (a) When is the particle moving to the right?
- (b) When is the particle at rest?
- (c) When does the particle change direction?
- (d) What is the farthest to the left of the origin that the particle moves?

**1975 AB2**

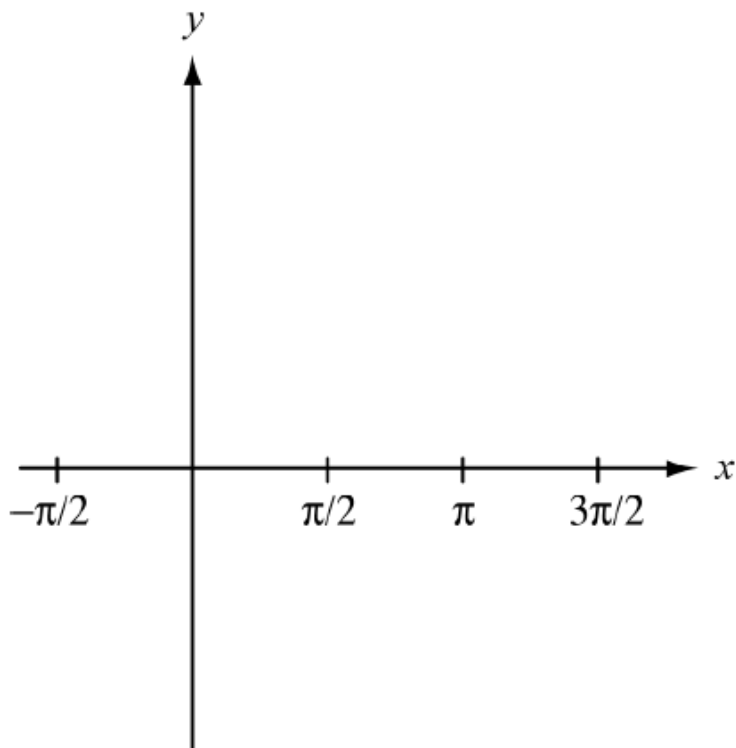
A particle moves along the  $x$ -axis in such a way that its position at time  $t$  for  $t \geq 0$  is given by  $x = \frac{1}{3}t^3 - 3t^2 + 8t$ .

- (a) Show that at time  $t = 0$ , the particle is moving to the right.
- (b) Find all values of  $t$  for which the particle is moving to the left.
- (c) What is the position of the particle at time  $t = 3$ ?
- (d) When  $t = 3$ , what is the total distance the particle has traveled?

**1975 AB4/BC1**

Given the function defined by  $y = x + \sin x$  for all  $x$  such that  $-\frac{\pi}{2} \leq x \leq \frac{3\pi}{2}$ .

- (a) Find the coordinates of all maximum and minimum points on the given interval. Justify your answers.
- (b) Find the coordinates of all points of inflection on the given interval. Justify your answers.
- (c) On the axes provided, sketch the graph of the function.



**1977 AB6**

A rectangle has a constant area of 200 square meters and its length  $L$  is increasing at the rate of 4 meters per second.

- (a) Find the width  $W$  at the instant the width is decreasing at the rate of 0.5 meters per second.
- (b) At what rate is the diagonal  $D$  of the rectangle changing at the instant when the width  $W$  is 10 meters?