

2011 AP[®] CALCULUS AB FREE-RESPONSE QUESTIONS

CALCULUS AB
SECTION II, Part A

Time—30 minutes

Number of problems—2

A graphing calculator is required for these problems.

1. For $0 \leq t \leq 6$, a particle is moving along the x -axis. The particle's position, $x(t)$, is not explicitly given. The velocity of the particle is given by $v(t) = 2 \sin(e^{t/4}) + 1$. The acceleration of the particle is given by $a(t) = \frac{1}{2}e^{t/4} \cos(e^{t/4})$ and $x(0) = 2$.
- (a) Is the speed of the particle increasing or decreasing at time $t = 5.5$? Give a reason for your answer.
- (b) Find the average velocity of the particle for the time period $0 \leq t \leq 6$.
- (c) Find the total distance traveled by the particle from time $t = 0$ to $t = 6$.
- (d) For $0 \leq t \leq 6$, the particle changes direction exactly once. Find the position of the particle at that time.
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WRITE ALL WORK IN THE EXAM BOOKLET.