AP CALCULUS
2011AB1 NAME: PERIOD:
9 POINTS

You *MAY* use a calculator.

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 $v(t) = 2\sin\left(e^{t/4}\right) + 1$. The acceleration of the particle is given by $a(t) = \frac{1}{2}\, e^{t/4} \cos\left(e^{t/4}\right)$ 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 $t = 0$ to $t = 6$.

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(d) For $0 \leq t \leq 6$, the particle changes direction exactly once. Find the position of the particle at that time.