AP Calculus Mock Exam

AB 2

t	0	2	6	8	10	12
$y'(t)$	4	8	-2	3	-1	-5

The vertical position of a particle moving along the y-axis is modeled by a twice-differentiable function $y(t)$ where t is measured in seconds and $y(t)$ is measured in meters. Selected values of $y'(t)$, the derivative of $y(t)$, over the interval $0 \le t \le 12$ seconds are shown in the table above. The position of the particle at time $t = 12$ is $y(12) = -3$.

(a) Use a locally linear approximation of y at $t = 12$ to approximate $y(11.8)$.

(b) Approximate $y''(4)$ using the average rate of change of $y'(t)$ on the interval $2 \le t \le 6$.

(c) Using correct units, explain the meaning of $y''(4)$ in the context of the problem.

(d) Find the average value of the acceleration of the particle over the interval $[0, 12]$.

(e) Using a midpoint Riemann sum and three subintervals of equal length, approximate $\int_0^{12} y'(t)\,dt$.

(f) Using correct units, explain the meaning of $\int_0^{12} y'(t)\,dt$ in the context of the problem.

(g) Explain why there must be at least three times t in the interval $0 < t < 12$ such that $y'(t) = 0$.

(h) Explain why there must be at least two times t in the interval $0 < t < 12$ such that $y''(t) = 0$.