

### AP Calculus Exam Velocity/Acceleration/Speed Graphing Calculator Application Problem

Stephen swims back and forth along a straight path in a 50-meter-long pool for 90 seconds. Stephen's velocity is modeled by  $v(t) = 2.38e^{-0.02t}\sin\left(\frac{\pi}{56}t\right)$ , where  $t$  is measured in seconds and  $v(t)$  is measured in meters per second.

- (a) Find all times  $t$  in the interval  $0 < t < 90$  at which Stephen changes direction. Give a reason for your answer.
- (b) Find Stephen's acceleration at time  $t = 60$  seconds. Show the setup for your calculations, and indicate units of measure. Is Stephen speeding up or slowing down at time  $t = 60$  seconds? Give a reason for your answer.