Math 260 Lab 8   Position, Velocity and Acceleration Activity

A ball is released on asteroid Weirdo, where the gravitation field does weird things. The ball's altitude for a 10 second time period is given by

$$s(t) = \left(t^2 - 2t\right) \sin\left(\frac{t}{2}\right) + 80, \text{ for } t \in [0, 10]$$

where s is measured in meters and t in seconds. **_Answers to questions involving position, velocity, and acceleration must be written in complete sentences and labeled with the correct units._** All approximations should be accurate to five digits.

1. Create four graphs.

   (a) The graph of s on the interval from 0 to 10 seconds.

   (b) The graph of s on the interval from 0 to 2 seconds.

   (c) The graph of the velocity of the ball on the interval from 0 to 10 seconds.

   (d) The graph of the acceleration of the ball on the interval from 0 to 10 seconds.

2. (a) Find the velocity at 4 seconds.

   (b) Find the acceleration at 4 seconds.

3. When is the altitude 80 meters? What is the ball's velocity at those times? What is the ball's acceleration at those times?

4. When is the ball's velocity positive? What is happening with the graph of s in those intervals?

5. When is the ball's acceleration positive? What is the shape of the graph of s on those intervals?

6. What is the maximum altitude attained by the ball during the 10 second period? What is its velocity at that point in time? What is its acceleration at that point in time?