Basic Differentiation Rules and Rates of Change Notes
Section 2.2c

Read pages 112 (and then 113) and fill in the blanks below. Look for a relationship between the position function, \( s(t) \) and the velocity function, \( v(t) \).

**Position Function** (of an object under the influence of gravity) = \( s(t) = \) ______________

Where \( s_0 \) is ____________________________________________,
\( v_0 \) is ____________________________________________,
and \( g \) is ____________________________________________
On earth, the value of \( g \) is approximately ________________ or ________________.

**Average Velocity** (also called ________________________________)
on a closed interval \([a,b]\) = ______________________________

**Instantaneous Velocity** (also called __________________________)
\( v(t) = \) ____  = ______________

\[ v(t) = \] ________________

\[ = \] ________________

**Speed** = ____  = ____  = ________________

What is the difference between average velocity and instantaneous velocity? ________________

________________________________________________________________________

________________________________________________________________________
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What is the difference between instantaneous velocity and speed?
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

Study the Examples 9 and 10 and then try the problem below.

A ball is dropped from the top of a building that is 1500 feet high.

a. What is the general position function? \( s(t) = \) ________________

b. Which value for \( g \) should you use? ______ Why? ________________


c. What is the value for \( v_0 \) ? _____

d. What is the value for \( s_0 \) ? _____

e. Write the particular position function with the values for \( g \), \( v_0 \) and \( s_0 \) that you chose in part b, c and d.
\[ s(t) = \] ________________
\[ = \] ________________

f. Determine the **average velocity** for the ball for the time interval between 0 seconds and 3 seconds or \([0,3]\). Hint: you’ll have to find its **position** at time \( t = 0 \) and at time \( t = 3 \). Show your work.
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g. Find the **instantaneous velocity** when \( t = 3 \). Show your work.

h. Find the time required for the ball to hit the ground. Show your work.

i. Find the velocity of the ball just prior to hitting the ground. Show your work.
j. What was the speed of the ball when it hit the ground? Show your work.