2.1 Limits, Rate of Change and Tangent Lines

Rates of change are used to study relationships between two quantities.

Eg. Velocity: rate of change of position with respect to time

Population Growth: Growth rate with respect to time

Change in position = Velocity x change in time.

However velocity is not constant. When driving a car the driver may speed up or slow down during a time period. Therefore we will calculate average velocity.

Average Velocity =

1. A ball is dropped from a state of rest at time *t = 0.* The distance traveled after *t* seconds is $s(t) = 16t^2$ ft.

a) Compute the average velocity over the time period $[3,3.01]$

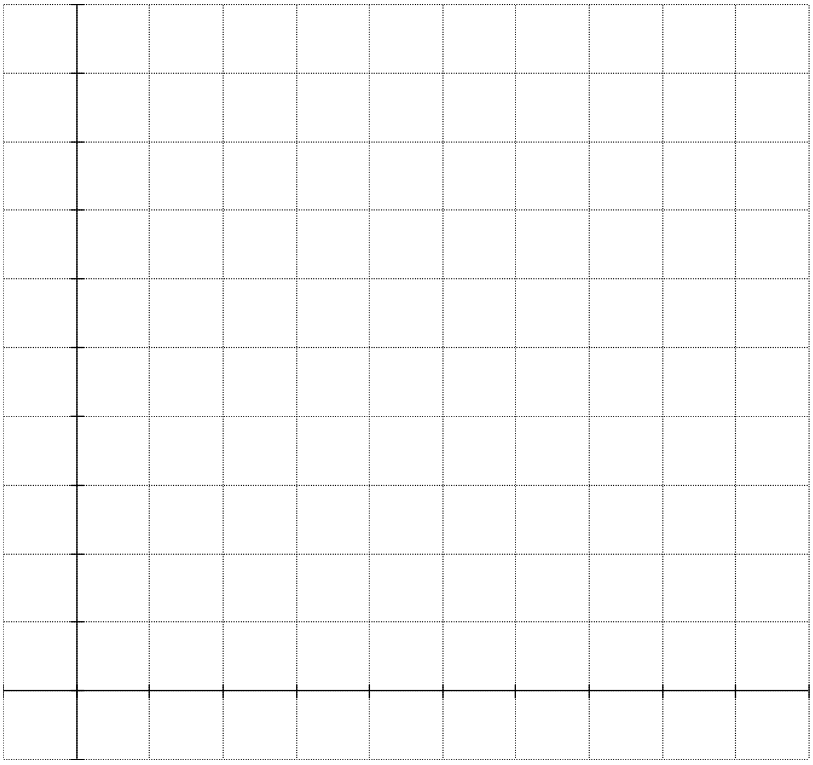
b) Shrink the time intervals and calculate the average velocities.

Time Interval	**Average Velocity**
$[3,3.01]$	
$[3,3.005]$	
$[3,3.001]$	
$[3,3.0005]$	

As the intervals shrink the average velocity is approaching

Tangent Line:_____

Secant Line:_____



Slope of secant =

As the time interval shrinks the slope of the secant line _____

_____