Worksheet 1

Name:

Major:

Calculus is:

1. We watched a video of Usain Bolt running the 100 m sprint in a time of 9.58 seconds. Consider the following numbers:

(i) Usain's average velocity on the time interval $[0, 9.58]$

(ii) Usain's velocity (instantaneous) at time $t = 9.58$ seconds

(a) Compute the value of (i) and include units.

(b) Which of the two numbers between (i) and (ii) do you suspect is larger? Briefly explain your reasoning.

2. The height of an object thrown in the air can be modeled using a parabola that opens down. Suppose we throw a ball straight up in the air from an initial height of 4 ft. The height of the ball at time t (in seconds) is given by the equation

$$y(t) = -16(t-2)^2 + A$$

(a) Find the exact value of the constant A

(b) Plot the height of the ball as a function of time.

(c) At which t values does the ball have zero (instantaneous) velocity ?

(d) Give two t values, t_1 and t_2, with the property that the *speed* of the ball at time t_1 is exactly the same as the speed at time t_2. (Hint: You don't actually have to calculate anything. Just use a symmetry agruement)