Quiz 5; Wednesday, February 24
MATH 53 with Professor Stankova
Section 116; 3-4
GSI: Eric Hallman

Student name:

You have 10 minutes to complete the quiz. Calculators are not permitted, and remember to show your calculations and explain your reasoning in order to receive full credit.

1. A ball is dopped from the top of Sather Tower (starting position $\langle 0, 0, 93.6\rangle$ meters). If the acceleration due to gravity is $\langle 0, 0, -9.8\rangle m/s^2$, find the ball's position as a function of time.

   $\mathbf{v}(T) = \int_0^T \langle 0, 0, -9.8\rangle \, dt = \langle 0, 0, -9.8T\rangle$ (in m/s).

   $\mathbf{r}(T) = \int_0^T \langle 0, 0, 93.6 - 9.8t\rangle \, dt = \langle 0, 0, 93.6 - 4.9T^2\rangle$ (in meters).

2. Using the formula $\kappa = |d\mathbf{T}|/|ds|$ or $\kappa = |\mathbf{T}'(t)|/|\mathbf{r}'(t)|$, find the curvature of the ball's path as a function of time. Explain your answer.

   $\mathbf{T} = \langle 0, 0, -1\rangle$ the entire time that the ball is in the air, so $|d\mathbf{T}|/|ds| = 0$ at all points in time. This is because the ball falls in a straight line, and straight lines are not curved.