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 dropped from the top of Sather Tower (starting position \(0, 0, 93.6\) meters). If the acceleration due to gravity is \(\langle 0, 0, -9.8\rangle \text{ m/s}^2\), find the ball’s position as a function of time.

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

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

2. Using the formula \(\kappa = |dT|/|ds|\) or \(\kappa = |T'(t)|/|r'(t)|\), 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 \(|dT|/|ds| = 0\) at all points in time. This is because the ball falls in a straight line, and straight lines are not curved.