

**Instructions:** Show all work. Use exact answers unless specifically asked to round. Be sure to complete all parts of each question.

1. An object is dropped into a gravity field with  $\vec{a} = -5\hat{j}$  ft/sec<sup>2</sup>. It has initial velocity  $\vec{v}(0) = 2\hat{i} + \hat{j}$  and initial position  $\vec{r}(0) = -\hat{i} + 300\hat{j}$ . Find the position function for the particle at time  $t > 0$ . When and where does the particle hit the ground?
2. Find the center of mass for the tetrahedron bounded by  $x = 0, y = 0, z = 0, x + y + z = 1$  with density  $\rho(x, y, z) = y$ .