1. (3, 3, 4 pts) During his famous moon walk on July 20, 1969, Neil Armstrong took one small step with an initial speed of 4 m/s and at an angle of 45° to the moon surface. Consider that he jumped in the direction of the x-axis and use 2 m/s^2 as the gravity for the moon. Find, as functions of time t

   (a) his velocity,

   (b) his position,

   (c) how far from his starting point he landed. (Is that a giant leap or what?)

2. Suppose you start at the point $(0, 0, 3)$ and move 10 units of length along the curve

$$x = 3\sin t, \quad y = 4t, \quad z = 3\cos t$$

   in the negative t–direction. Where are you now?

3. (4, 3, 3 pts) The position of a car is going around a track after starting at time $t = 0$ is given by $\vec{r}(t) =< x(t), y(t) >=< 2\cos t^2, \sin t^2 >$. At $t = \sqrt{\pi}$, the car is at $\vec{r}(\sqrt{\pi}) =< -2, 0 >$.

   (a) Compute the unit tangent vector at time $t = \sqrt{\pi}$.

   (b) Compute the acceleration at time $t = \sqrt{\pi}$.

   (c) Sketch the track and the two vectors you found, starting at the position of the car at $t = \sqrt{\pi}$.