Math 055 Calculus III. March 1, 2010

Problem. Suppose that a skater is getting some practice on a circuit with parametric equations:

\[ x(t) = 20 \cos t \]
\[ y(t) = 20 \sin t \]
\[ z(t) = 20 \sin^2 t \]

The variables \( x, y \) and \( z \) are in meters and the variable \( t \) is in seconds.

At time \( t = \pi/2 \) the skater miscalculates the turn and leaves the tracks in a flight. If the only force acting on the skater is gravity, where is she going to land? at which time? The gravitational constant is \( g = 9.8 \text{m/s}^2 \). Sketch the circuit and the trajectory of the skater after leaving the circuit.