Math 2400 Calculus 3, Fall 2014
Homework Set 4
Due: 09/23/14

1. Find the (possibly negative) values of t where the curve

$$\mathbf{r}(t) = \langle t, 0, 2t - t^2 \rangle$$

   intersects the paraboloid

$$z = x^2 + y^2.$$

2. 10.2: #26

3. Suppose a fly is buzzing around a room, and his velocity is given by the following vector function over time:

$$\mathbf{v}(t) = \left\langle t^2, t, \frac{1}{t^2 + 1} \right\rangle.$$

   (You can assume the units are m/s).

   Find how far the fly has traveled in the x-direction, y-direction, and z-direction from $t = 0$ to $t = 1$.

4. Consider the spiral given by

$$\mathbf{r}(t) = \langle t \cos t, t \sin t, \sqrt{2}t \rangle.$$

   Find the arc length from $t = 0$ to $t = 1$.

5. 10.3: #46.