Math 32 – Workshop #8

1. Sketch the part of the circle given by the parameterization. Be sure to denote direction, as well as the initial and terminal points.

   (a) $\vec{\mathbf{r}} = \langle \cos(t), \sin(t) \rangle, \quad \frac{3\pi}{4} \leq t \leq \frac{7\pi}{4}$

   (b) $\vec{\mathbf{r}} = \langle \cos(2t), \sin(2t) \rangle, \quad \frac{\pi}{2} \leq t \leq \frac{3\pi}{2}$

   (c) $\vec{\mathbf{r}} = \left\langle \cos\left(\frac{t}{2}\right), \sin\left(\frac{t}{2}\right) \right\rangle, \quad \frac{\pi}{2} \leq t \leq \frac{3\pi}{2}$

2. Find the domain of $\vec{\mathbf{r}} = \left\langle \sqrt{t+7}, \ln(9-t), \frac{1}{3t-6} \right\rangle$ and sketch it on a number line.

3. Show that the curve with parametric equations $x = 4\sin t$, $y = 4\cos t$, $z = \sin^2 t$ lies on the intersection of $16z = x^2$ and $x^2 + y^2 = 16$.

4. Do the following paths intersect? Do particles traveling along the paths collide? Find any points of intersection, or collision points.

   (a) $\vec{\mathbf{q}} = 5t\,\vec{\mathbf{i}} + (t-3)\,\vec{\mathbf{j}} + (t^2+1)\,\vec{\mathbf{k}}$

   $\vec{\mathbf{r}} = t^2\,\vec{\mathbf{i}} + (2t-8)\,\vec{\mathbf{j}} + (4t+6)\,\vec{\mathbf{k}}$

   (b) $\vec{\mathbf{q}} = (t+4)\,\vec{\mathbf{i}} + (2t+1)\,\vec{\mathbf{j}} + t^2\,\vec{\mathbf{k}}$

   $\vec{\mathbf{r}} = 3t\,\vec{\mathbf{i}} + (7-t)\,\vec{\mathbf{j}} + t^3\,\vec{\mathbf{k}}$