

Math 241 Class Exercise: Arclength
Dr. Fred Park, Whittier College

1. Plot the curve in matlab $\vec{r}(t) = \langle t^2, \sin t, t \rangle$ for $3 \leq t \leq 9$. Reparametrize the curve using the parametrization $t = g(s) = e^s$ so that we obtain the curve defined by $\vec{r}_1(s) = \vec{r}(g(s))$. What are the bounds on s ? Is this the same curve?
2. For the previous curve, calculate and plot by hand the tangent vectors to the original curve parametrized by t at 3 points chosen by yourself. What do you notice?
3. Find the arc length parametrization for the helix $\vec{r}(t) = \langle \cos 4t, \sin 4t, 3t \rangle$ for $0 \leq t \leq 2\pi$.
4. Find the arc length parametrization for the helix $\vec{r}(t) = \langle \cos 4t, \sin 4t, 3t \rangle$. What are the lengths of the tangent vectors at any point on the curve?