Quiz, Feb 15

NAME:

For most accurate results, try doing this without a textbook and spend no more than 15-20 minutes...

0.1. Vector Valued Functions. At t = 0, the vector valued functions

$$\vec{r}(t) = \langle e^t, t, t^2 \rangle$$

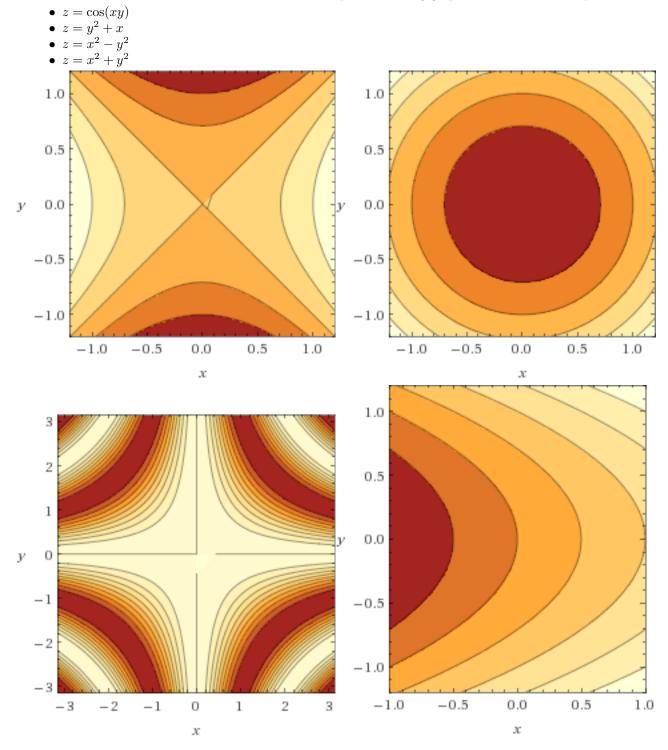
$$\vec{s}(t) = \langle -t + 1, t, t^3 \rangle$$

intersect each other. What is the angle of their intersection?

0.2. Vector Valued Functions, II. The helix is drawn out by the function $\vec{r}(t) = \langle \sin t, \cos t, t \rangle$. What is the arclength of the curve over the range $0 \le t \le 2\pi$.

Bonus Problem. Worth no points! A small rocket is tied to a stick which is one meter long. The other end of the stick is tied to the origin. The rocket travels in a path $\vec{r}(t)$ – which is only confined by the stick. Geometrically justify and mathematically prove the following relation:

 $\vec{r'}(t) \cdot \vec{r}(t) = 0.$



0.3. Functions and Contour Plots. Quick! Match up the following graphs with their contour plots.