

Math 241 Class Exercise: Space Curves and Plotting
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1. Find the vector equation for the line segment that joins the point $P(1, 2, 3)$ and $Q(2, -1, -5)$. Does the following formula look familiar?

$$\vec{r}(t) = (1 - t)\vec{r}_0 + t\vec{r}_1$$

2. Find the vector function that represents the curve of intersection of the cylinder $x^2 + y^2 = 5$ and $y + 2z = 7$.
3. Sketch the curve (by hand) whose vector equation is given by $\vec{r}(t) = \langle \cos t, \sin t, t^2 \rangle$. Use matlab to now sketch the curve where the outline is traced out like that in class.
4. Sketch the following curves in matlab:
 - (a) $\vec{r}(t) = \langle (4 + \sin 20t) \cos t, (4 + \sin 20t) \sin t, \cos 20t \rangle$
 - (b) $\langle (2 + \cos 1.5t) \cos t, (2 + \cos 1.5t) \sin t, \sin 1.5t \rangle$
5. Find a vector valued function that represents the intersection of the circular cylinder $x^2 + y^2 = 4$ and the parabolic cylinder $z = x^2$. i.e. parametrize the space curve defined by the intersection and draw it.