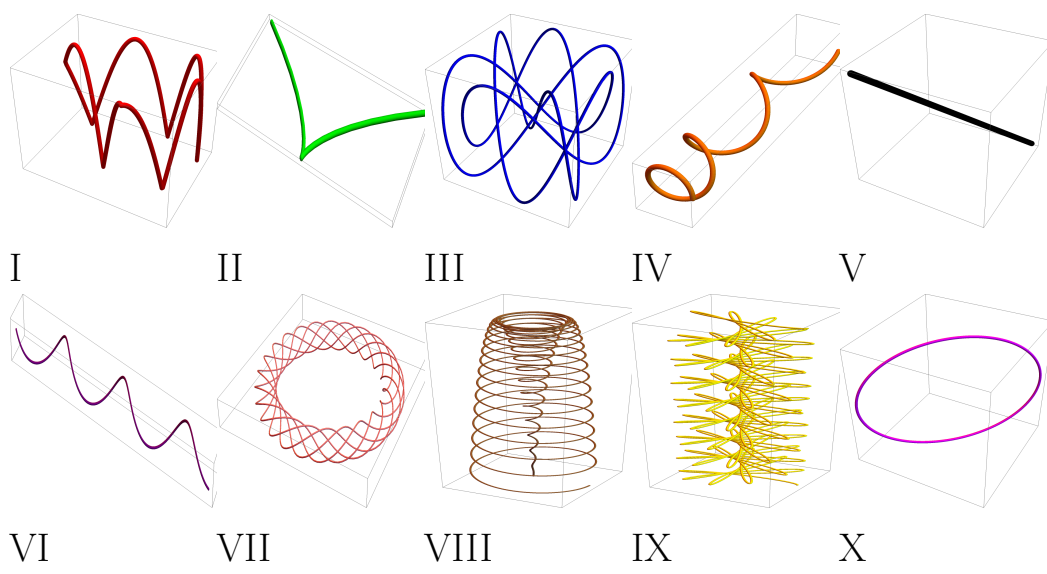# Math 2415
Homework on 13.1

1. Match the curves below with the parametric equations. Justify your answers. (There are more curves than equations. The origin is in the middle of each box.)

   (a) $\mathbf{r}(t) = (t, t, t)$

   (b) $\mathbf{r}(t) = (\cos(t), t^2, \sin(t))$

   (c) $\mathbf{r}(t) = (t^3, t^2, 0)$

   (d) $\mathbf{r}(t) = (\cos t, \cos t, \sin t)$

| I | II | III | IV | V |

| VI | VII | VIII | IX | X |

2. Show that the curve with parametrization $x = \sin t$, $y = \cos t$, $z = \cos 4t$ for $0 \le t \le 2\pi$ lies on the circular cylinder $x^2 + y^2 = 1$. Sketch the cylinder and the curve.

3. Parametrize the ellipse $x^2 + 4y^2 = 1$ in $\mathbf{R}^2$.

4. Parametrize the curve obtained by intersecting the plane $x + y = 1$ with the portion of cone $z^2 = x^2 + y^2$ that lies above the plane $z = 0$.

5. Parametrize the curve obtained by intersecting the cylinders $x^2 + z^2 = 1$ and $y^2 + z^2 = 1$. There are 3D-printed models you can use to help visualize these Intersecting Cylinders.