

### Problem Set 3: Extra Problems

1. Find the locus of points  $P$  on the plane  $2x + y + z = 4$  with the property that the line through  $(5, 1, 2)$  and  $P$  intersects the line with parametric equation  $\mathbf{r}(t) = \langle 1 + t, 3, 2 - t \rangle$ .
2. Show that for any  $u, v$ , the point  $x = u \cos v, y = u \sin v, z = u^2$  lies on the paraboloid  $z^2 = x^2 + y^2$ . (This gives a parameterization of this surface; in contrast to parametric curves, this requires two variables.)
3. Find a parametric equation for the curve of intersection of the cone  $z^2 = x^2 + y^2$  and the plane  $y + 2z = 2$ .