Eddie Price **Quiz 9 Solutions** **Summer 2018**

High score: 20; (nonzero) Low score: 12; Average score: 19.31

Problem 1 (20 Points). Find a parametric representation for the part of the surface $x^2+y^2 = 4z^2$ that lies above the xy-plane.

Solution.

There are many valid solutions one could give. For example, one could notice that in order to be above the xy-plane, we need $z > 0$. As such, we could solve the above equation for z:

$$z = \sqrt{\frac{x^2}{4} + \frac{y^2}{4}} = \frac{\sqrt{x^2+y^2}}{2}$$

You could then have the following parameterization:

$$\boxed{x = x, \qquad y = y, \qquad z = \frac{\sqrt{x^2+y^2}}{2}, \qquad 0 < x^2 + y^2}$$

Alternatively, you could try viewing the surface in cylindrical coordinates. In this case, $x = r\cos\theta$, $y = r\sin\theta$, and $r^2 = 4z^2$. Solving for z and noticing that we want $z > 0$, we get the parameterization:

$$\boxed{x = r\cos\theta, \quad y = r\sin\theta, \quad z = \frac{r}{2}, \quad r > 0, \quad 0 \leq \theta < 2\pi}$$