Question: The plane through the point (-1, 4, 2) that contains the line of intersection of the planes $4x - y + z - 2 = 0$ and $2x + y - 2z - 3 = 0$.

Plane 1 has normal $\vec{n}_1 = \langle 4, -1, 1 \rangle$. Plane 2 has normal $\vec{n}_2 = \langle 2, 1, -2 \rangle$. The line that passes through both planes must have a directional vector perpendicular to both normals; that is, $\vec{v} = \langle 1, 10, 6 \rangle$.

The planes intersect at the points, $\langle x, y, z \rangle = \langle \frac{t-5}{6}, \frac{5t+4}{3}, t \rangle$. Let us choose $t = 0$: then an intersection is at $\langle x, y, z \rangle = \langle -\frac{5}{6}, \frac{4}{3}, 0 \rangle$.

The vector formed from (-1, 4, 2) to this point is given by $u = \frac{1}{6}, -\frac{8}{3}, -2$. Then, the normal vector is $n = \langle 4, -3, 13/3 \rangle$.

Then, the plane is:

$$4(x+1) - 3(y-4) + \frac{13}{3}(z-2)$$

$$4x - 3y + \frac{13}{3}z = \frac{18}{3}$$