Problem 1: Find a plane that is perpendicular to the planes $x + y + z = 1$ and $x + 2y + 3z = 1$.

The normals to the two planes are $\mathbf{n}_1 = \langle 1, 1, 1 \rangle$ and $\mathbf{n}_2 = \langle 1, 2, 3 \rangle$. The normal of the desired plane should be orthogonal to these, so $\mathbf{n}_3 = \mathbf{n}_1 \times \mathbf{n}_2 = \langle 1, -2, 1 \rangle$. A suitable plane has the form $\mathbf{x} \cdot \langle 1, -2, 1 \rangle = d$ for some $d$. One particular plane is $\mathbf{x} \cdot \langle 1, -2, 1 \rangle = 0$ or $x - 2y + z = 0$. 
Problem 2: Find the points on the curve $c(t) = (3t^2 - 2t, t^3 - 6t)$ where the tangent line has slope 3.

The slope is

$$\frac{dy}{dx} = \frac{y'(t)}{x'(t)} = \frac{3t^2 - 6}{6t - 2} = 3$$

$$3t^2 - 6 = 3(6t - 2)$$

$$t^2 - 2 = 6t - 2$$

$$t^2 = 6t$$

$$t = 0 \implies c(t) = (0, 0)$$

$$t = 6 \implies c(t) = (96, 180)$$