Question 2 **(6 marks)**

(a) Solve the following system of equations: (3 marks)

$$4x - y - 2z = 5$$
$$2x + y - z = 4$$
$$x - y - z = 3$$

Consider another set of equations where k is a constant.

$$2x - y - z = 0$$
$$x - 2y - z = 2$$
$$x - 2y + kz = 6$$

It can be shown that this system of equations can be reduced to the following:

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

(b) Explain whether this system of equations will have a unique solution for all real values of k. If not, explain the geometric interpretation of this. (3 marks)