

## HW #2 Solutions.

13. point  $(-1, -1, -1)$   $v = (0, 1, 0)$

$$x = -1 + 0t = -1$$

$$y = -1 + 1t = t - 1$$

$$z = -1 + 0t = -1$$

$$l(t) = (-1, t-1, -1)$$

$$l(t) = -1\hat{i} + (t-1)\hat{j} - 1\hat{k}$$

16. line through points  $P(-5, 0, 4)$  and  $Q(6, -3, 2)$

$$x = -5 + (6 - (-5))t = -5 + 11t$$

$$y = 0 + (-3 - 0)t = -3t$$

$$z = 4 + (2 - 4)t = 4 - 2t$$

22. Do the lines  $(x, y, z) = (t+4, 4t+5, t-2)$  and  $(x, y, z) = (2s+3, s+1, 2s-3)$  intersect?

$$(1) t_1 + 4 = 2s_1 + 3$$

$$(2) 4t_1 + 5 = s_1 + 1$$

$$(3) t_1 - 2 = 2s_1 - 3$$

Solve for  $t_1$  in (1):

$$t_1 = 2s_1 + 3 - 4$$

$$t_1 = 2s_1 - 1$$

Substitute into (2):

$$4(2s_1 - 1) + 5 = s_1 + 1$$

$$8s_1 = s_1$$

$$s_1 = 0$$

Substitute value for  $s_1$  into (3):

$$t_1 - 2 = 2(0) - 3$$

$$t_1 = -1$$

So yes, lines intersect when  $t_1 = -1$  and  $s_1 = 0$ .