

Math 241 X8**Name(s):****Homework 3 supplement**

This is a written homework supplement to the homework for Unit 3: Perpendicularity. It also covers some material from Unit 2: Vectors.

In 2D, there is only one “flat” object: lines. In 3D, there are both lines and planes. Two lines are *parallel* if they have the same direction. Two planes are *parallel* if they have the same normal direction.

- (1) Find an equation for the line passing through (4,5,6) and intersecting the plane $3x + 2y - z = 1$ at a right angle.

(2) In each of the following, two lines are given. If they are parallel or if they intersect, find an equation of the plane containing both of them. Otherwise, find the equations of the two planes, one containing each line, such that the planes are parallel to each other.

(a) $\ell_1(t) = (3, 1, 4) + t(6, 1, 8)$, $\ell_2(t) = (13, 4, 26) + t(2, 1, 7)$

(b) $\ell_3(t) = (2, -1, 8) + t(3, 2, 3)$, $\ell_4(t) = (-1, 1, 0) + t(4, 1, -1)$

(c) $\ell_5(t) = (5, 4, 2) + t(3, -1, 5)$, $\ell_6(t) = (2, 1, 1) + t(-6, 2, -10)$

(d) $\ell_7(t) = (6, 15, -17) + t(2, 4, -8)$, $\ell_8(t) = (0, 3, 7) + t(-1, -2, 4)$ (hint: this is a trick question)