Worksheet #6; date: 02/06/2018
MATH 53 Multivariable Calculus

1. **Correction about scalar projections: It is SIGNED.**

2. *(Stewart 12.5.5)* Find a vector equation and parametric equations for the line through the point $(1, 0, 6)$ and perpendicular to the plane $x+3y+z = 5$.

3. *(Stewart 12.5.11)* Find a parametric equation and a symmetric equation for the line through $(-6, 2, 3)$ and parallel to the line

$$\frac{1}{2}x = \frac{1}{3}y = z + 1.$$

   How does the symmetric equation of the new line compare to the old one?

4. *(Stewart 12.5.19)* Determine whether the lines L_1 and L_2 are parallel, skew, or intersecting. If they intersect, find the point of intersection.

$$\begin{aligned} L_1: &\quad x = 3 + 2t, \quad y = 4 - t, \quad z = 1 + 3t \\ L_2: &\quad x = 1 + 4s, \quad y = 3 - 2s, \quad z = 4 + 5s \end{aligned}$$

5. *(Stewart 12.5.35)* Find an equation of the plane that passes through the point $(3, 5, -1)$ and contains the line

$$x = 4 - t, \quad y = 2t - 1, \quad z = -3t.$$

6. *(Stewart 12.5.55)* Determine whether the planes are parallel, perpendicular, or neither. If neither, find the angle between them. (Leave as inverse trigonometric functions where necessary.)

$$2x - 3y = z, \quad 4x = 3 + 6y + 2z.$$

7. *(Stewart 12.5.73)* Find the distance between the given parallel planes

$$2x - 3y + z = 4, \quad 4x - 6y + 2z = 3.$$

8. *(Stewart 12.5.77)* Show that the lines with symmetric equations $x = y = z$ and $x+1 = y/2 = z/3$ are skew, and find the distance between these lines.

9. *(Stewart 12.6.11)* Use traces to sketch and identify the surface

$$x = y^2 + 4z^2.$$

10. *(Stewart 12.6.37)* Reduce the equation to one of the standard forms, classify the surface, and sketch it.

$$x^2 - y^2 + z^2 - 4x - 2z = 0.$$