COMP408 Assignment #1

1. [3 points] If f is a linear function such that $f(1, 2) = 0$ and $f(2, 3) = 1$, then what is $f(x, y)$?

2. [6 points] Use Gaussian elimination and augmented matrix to solve the following systems of equations.

$$\begin{aligned} 3x + y - z &= 1 \\ x - y + z &= -3 \\ 2x + y + z &= 0 \end{aligned}$$

3. [5 points] Consider the vectors $p_1 = 1 + x + 4x^2$ and $p_2 = 1 + 5x + x^2$ in p_2. Determine whether p_1 and p_2 lie in span$\{1 + 2x - x^2, 3 + 5x + 2x^2\}$.

4. [4 points] An airplane pilot flies at 300 km/h in a direction 30 degree south of east. The wind is blowing from the south at 150 km/h.

   a. Find the resulting direction and speed of the airplane.

   b. Find the speed of the airplane if the wind is from the west (at 150 km/h).

5. [4 points] In $\mathbf{R}^3$, let M denote the plane having equation $3x - 2y + z = 0$. Show that M is a subspace of $\mathbf{R}^3$.

6. [3 points] Use your knowledge of dot product to determine if A(4, −7, 9), B(6, 4, 4) and C(7, 10, −6) are the vertices of a right angle triangle?