SMA 1211 LINEAR ALGEBRA CAT 1

1. Find the direction cosines of $A(1,2,2)$ and $B(3,2,1)$ (5mks)
2. Find the angle between the vectors $a = 2\hat{\imath} + 3\hat{\jmath} + \hat{k}$ and $\vec{b} = 4\hat{\imath} + \hat{\jmath} + 2k$ (4mks)
3. A 0.50m wrench is at an angle of 30° with the ground. A force of 170N that makes an angle of 75° with the wrench turns the wrench. Find the torque. (3mks)
4. Let $u = (1,1,0)$, $v = (1,3,2)$ and $w = (4,9,5)$. Show that u, v, w are linearly dependent. (5mks)
5. Test whether $V = \{(x, 3x): x \in \mathbb{R}\}$ is a subspace $\mathbb{R}^2$ (3mks)
6. Row reduce the following matrix to echelon form and locate the pivots. (5mks)

$$\begin{matrix} 0 & 3 & -6 & 6 & 4 & -5 \\ 3 & -7 & 8 & -5 & 8 & 9 \\ 3 & -9 & 12 & -9 & 6 & 15 \end{matrix}$$

7. Use Gaussian elimination method to solve the following system of equations. (5mks)

$$x_1 + x_3 = 3$$
$$2x_2 - 2x_3 = -4$$
$$x_2 - 2x_3 = 5$$

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