Revision Question Day 3:

1. Generate an example of a symmetric and a skew symmetric matrix for dimensions 3x3.
2. For any general 2x2 matrix, what are the conditions on elements of the matrix for it to be an orthogonal matrix. Suppose the matrix is A = $\begin{matrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{matrix}$ what are the conditions/equations for a11,a12 etc.
3. Is the following procedure correct for an idempotent matrix
    a. A^2=A => A(A-I)=0 => either A=0 or A=I therefore, these are only two possibilities for A to be idempotent.

4. $\begin{matrix} 3 & -6 \\ 1 & -2 \end{matrix}$ what kind of matrix is this? Use the definitions from 'other names' slide.

5. Are the following vectors linearly independent.
    a. $\begin{matrix} 1 \\ 0 \\ 0 \end{matrix}, \begin{matrix} 0 \\ -1 \\ 0 \end{matrix}, \begin{matrix} 0 \\ 0 \\ 1 \end{matrix}$

    b. $\begin{matrix} 1 \\ 2 \\ 3 \end{matrix}, \begin{matrix} 2 \\ 3 \\ 4 \end{matrix}, \begin{matrix} 5 \\ 9 \\ 13 \end{matrix}$

6. If the vectors in Q4 formed a matrix, what is the rank of transpose of matrices. Specifically, you have two matrices A and B.
7. What is a full rank matrix?
8. If A = $\begin{matrix} 1 & 2 \\ 3 & 4 \end{matrix}$ B=$\begin{matrix} 5 & 6 \\ 7 & 8 \end{matrix}$, comment on rank of AB and BA

9. $\begin{matrix} 3 & 3 & 1 \\ 2 & -3 & 4 \\ 1 & 1 & -2 \end{matrix}$, calculate the determinant and adjoint for this matrix

10. For above matrix multiple second column with 2 and third column with 3 what is the new determinant? Can we comment on the generality of this result?

11. A nxn matrix with all the elements below the diagonal as 0. What is its determinant if all the elements on diagonal and above are 2.