

# ELL 701 - Mathematical Methods in Control

Minor 2

Nov 2016 (Late)

Time 1 Hrs

1. Verify that all matrices related through similarity transformations share the same determinant and the same eigenvalues. 2+3=5
2. Find the best (least square error) estimate of the vector  $[1 \ 1 \ 1]$ , on the plane spanned by the vectors  $[1 \ 2 \ 0]$  and  $[-1 \ 2 \ 0]$ . 10
3. (a) The eigen values of the matrix

$$A = \begin{bmatrix} 1 & a & 2 \\ a & -1 & 1 \\ 2 & 1 & 0 \end{bmatrix}$$

are  $(\lambda_1, \lambda_2, \lambda_3)$ . Then what are its singular values ?

- (b) For numerical purposes of solving  $Ax = b$ , the best possible case is where the condition number of  $A$  is .....

3+2 = 5

4. (a) Write down the probability (mass) functions for the Binomial and the Poisson Distributions, giving the meaning of each symbols.
- (b) A printing press prints out pages with mean errors per page 0.01. What is the probability that a page has 1 error ? 2+3=5