Analytical Methods in Engineering (EE300) Quiz No:

1) Eigenvales of matrix $\begin{bmatrix} a & -3 \\ 2 & d \end{bmatrix}$, are $\lambda_1=3$ and $\lambda_2=4$. Calculate a,d

2) The response of a dynamic system are shown in the figure. State true or false and write explanations.

a) This system has complex eigenvalues T
b) All eigenvalues are real F
b) Real parts of all eigenvalues are less than zero. F
c) This system has more than two eigenvalues T
d) This system has two eigenvalues one is F T
   real one is complex.
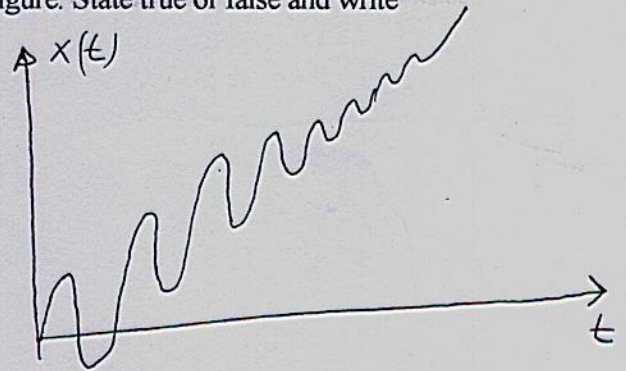
$$(a-\lambda)(d-\lambda) - (2)(-3)$$

$$ad - a\lambda - \lambda d + \lambda^2 + 6 = 0$$

$$\lambda^2 - (a+d)\lambda + 6 - ad = 0$$

$$(a-3)(d-3) - 2(-3) = 0$$

$$ad - 3a + 12 + 6 = 0 \qquad \lambda_1 + \lambda_2 =$$

$$(a-3)(d-3) - 2(-3) = 0$$

$$ad - 3a - 3d + 9 + 6 = 0 \qquad (a-4)(d-4) - 2(-3)$$

$$ad - 3a - 3d + 15 = 0 \qquad ad - 4a - 4d + 16 + 6 =$$

$$ad - 4a - 4d + 22 = 0$$

$$+ \qquad + \qquad -$$

$$\boxed{a+d = 7}$$

$$d = (7-a)$$

$$a + d - 7 = 0$$

$$a(7-a) - 3a - 3(7-a) + 15 =$$

$$-a^2 + 7a - 3a - 21 + 3a + 15 = 0$$

4
-3

$\dfrac{17 7}{2}$

$d - a + \lambda = 0$ $-a^2 + a + 11 = 0$