MA511 HW34 Sol.

#B.2

Sol. $u_2(t) = 8e^{8t}(tx_1 + x_2) + e^{8t}x_1$

$$Au_2 = e^{8t}(tAx_1 + Ax_2)$$

$$= e^{8t}(8tx_1 + 8x_2 + x_1)$$

#B.4

Sol. Block by block, build P from the cross-diagonal permutations P_i used on each block J_i.

Then $J = PJ^TP^{-1}$.

Every matrix A is similar to a Jordan matrix $J = M^{-1}AM$. Therefore A is similar to A^T:

$$M^{-1}AM = J = PJ^TP^{-1} = PM^TA^T(M^T)^TP^{-1}$$

$$\Rightarrow A = (MPM^T)A^T(MPM^T)^{-1}$$