Homework # 12 (due October 24). (Corrected!)

1(a) Verify that $Y_1(t) = e^{5t}\begin{pmatrix} 1 \\ 1 \end{pmatrix}$ and $Y_2(t) = e^{2t}\begin{pmatrix} 1 \\ -2 \end{pmatrix}$ are solutions of the system $\frac{dY}{dt} = AY$ with $A = \begin{pmatrix} 4 & 1 \\ 2 & 3 \end{pmatrix}$.

(b) Verify that $Y_1(t)$ and $Y_2(t)$ are linearly independent.

(c) Draw solution curves for $Y_1(t)$ and $Y_2(t)$ on the phase plane.

(d) What is the general solution of $\frac{dY}{dt} = AY$?

(e) Find a particular solution of the system in (a) with the initial condition $Y(0) = \begin{pmatrix} 7 \\ -11 \end{pmatrix}$.