# HW #13

1) $\lambda = 1, 1, 4$

2) $e^{ax}$ $\lambda = a^2$ $a, k$ are real numbers

$\sin kx$ $\lambda = -k^2$

$\cos kx$ $\lambda = -k^2$

3) $M = \begin{pmatrix} 1 & 1 \\ 1 & 3 \end{pmatrix}$ $\lambda = 2 \pm \sqrt{2}$

$\lambda_1 = 2+\sqrt{2}$ $v_1 = \begin{pmatrix} -1+\sqrt{2} \\ 1 \end{pmatrix}$ $\lambda_2 = 2-\sqrt{2}$ $v_2 = \begin{pmatrix} -1-\sqrt{2} \\ 1 \end{pmatrix}$

$P = \begin{pmatrix} -1+\sqrt{2} & -1-\sqrt{2} \\ 1 & 1 \end{pmatrix}$ $A = \begin{pmatrix} \sqrt{2} & -\sqrt{2} \\ 2+\sqrt{2} & 2-\sqrt{2} \end{pmatrix}$

$P^{-1} = \frac{1}{2\sqrt{2}} \begin{pmatrix} 1 & 1+\sqrt{2} \\ -1 & -1+\sqrt{2} \end{pmatrix}$ $B = \begin{pmatrix} 2+\sqrt{2} & 0 \\ 0 & 2-\sqrt{2} \end{pmatrix}$

Yes, $B = \begin{pmatrix} \lambda_1 & 0 \\ 0 & \lambda_2 \end{pmatrix}$

$v_1 \cdot v_2 = 0$