6 for $\begin{bmatrix} 0 \\ 1 \end{bmatrix} = c_1 e^{\lambda_1 \cdot 0} \begin{bmatrix} 1 \\ -6+\sqrt{6^2-4k}/2 \end{bmatrix} + c_2 e^{\lambda_2 \cdot 0} \begin{bmatrix} 1 \\ -6-\sqrt{6^2-4k}/2 \end{bmatrix}$

$$\begin{bmatrix} 0 \\ 1 \end{bmatrix} = \begin{bmatrix} c_1 + c_2 \\ -6/2(c_1+c_2) + \sqrt{6^2-4k}/2 (c_1 - c_2) \end{bmatrix}$$

$\Rightarrow 1 = \sqrt{6^2-4k}/2 (c_1 - c_2)$ & $c_1 = -c_2$

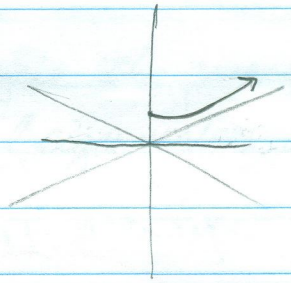
$\Rightarrow 1 = \sqrt{6^2-4k}\ (c_1) \Rightarrow c_1 = 1/\sqrt{6^2-4k} \quad c_2 = -1/\sqrt{6^2-4k}$

1/2 point for correct $x(t)$

λ_2 is always negative $\left(\lambda_2 = (-6-\sqrt{6^2-4k})/2\right)$,

and $\lambda_1 = (-6+\sqrt{6^2-4k})/2$

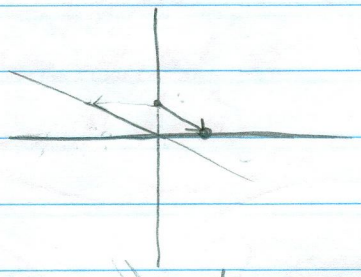
if $\lambda_1 > 0$ $x(t) \rightarrow$



approaches ∞ at eigenvector 1

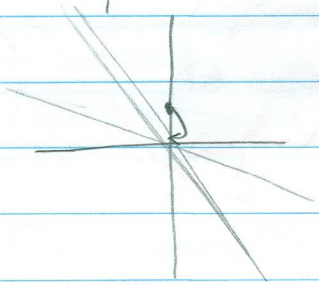
1/2 point for what happens to $x(t)$

if $\lambda_1 = 0$ $x(t) \rightarrow$



approaches c_1 eigenvector 1

if $\lambda_1 < 0$ $x(t) \rightarrow$



approaches origin alongside eigenvector 1