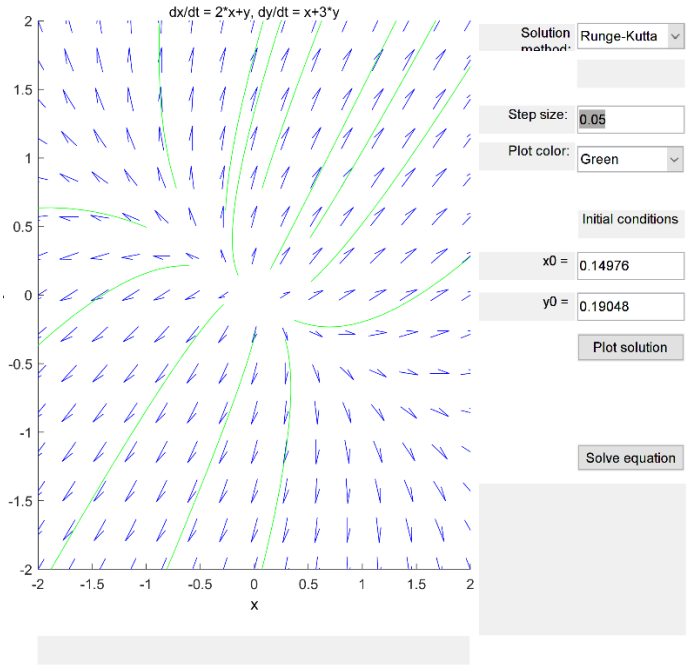
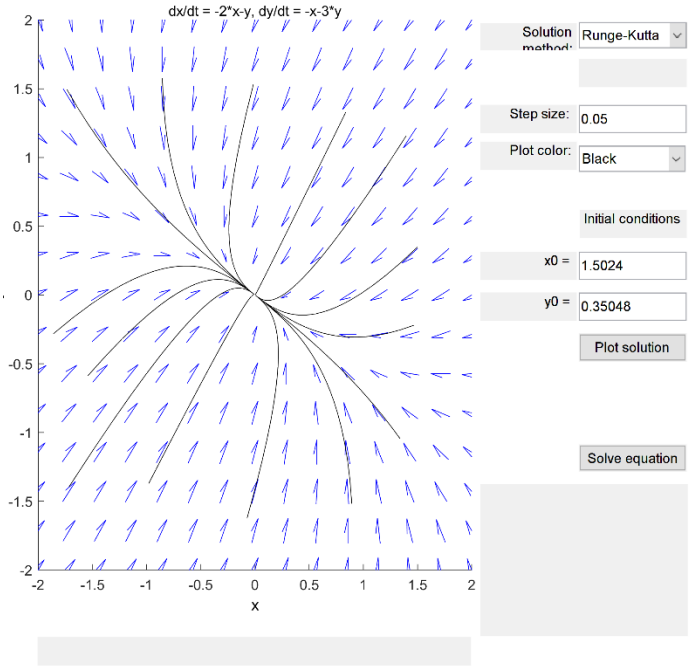
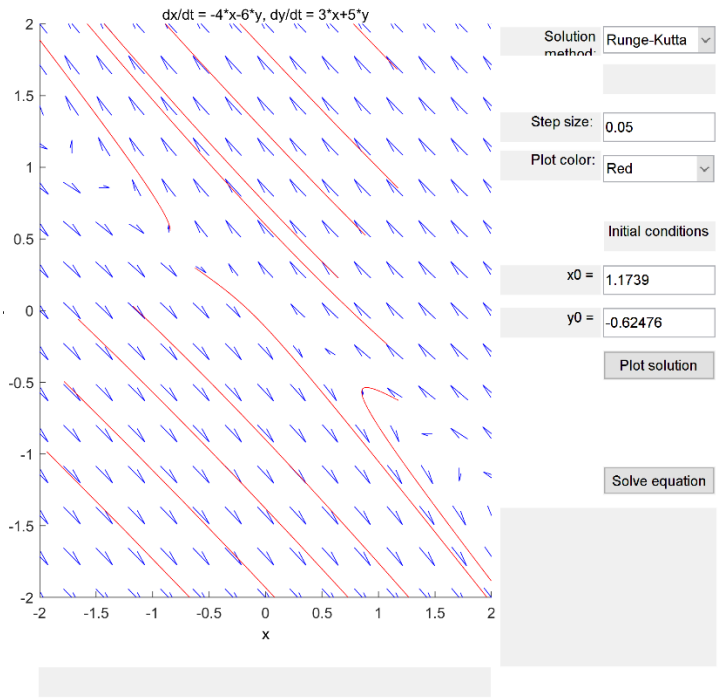
MATLAB – LAB3 – EXERCISE 4



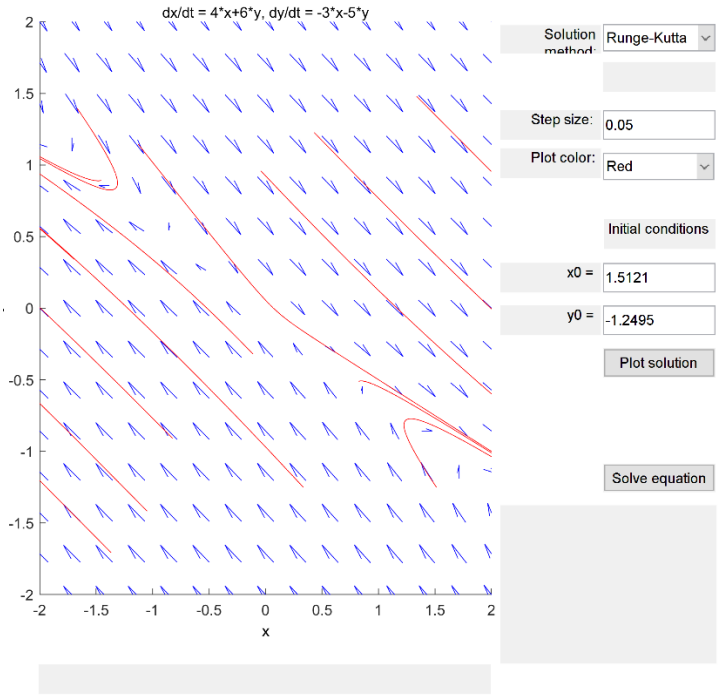
4.1: $\lambda_1 = \frac{5+\sqrt{5}}{2}$, $\lambda_2 = \frac{5-\sqrt{5}}{2}$ **Source Node – both eigenvalues are positive**



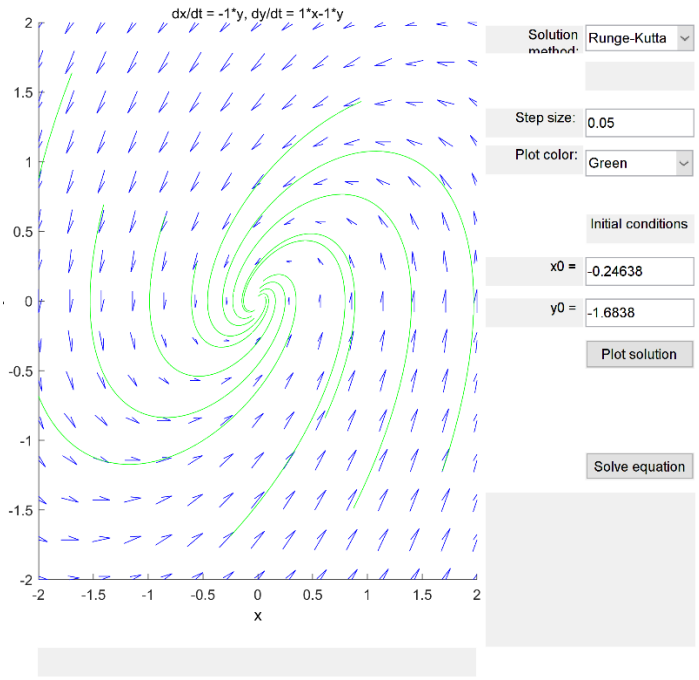
4.2: $\lambda_1 = \frac{-5+\sqrt{5}}{2}$, $\lambda_2 = \frac{-5-\sqrt{5}}{2}$ **Nodal sink – asymptotically stable – both eigenvalues are negative**



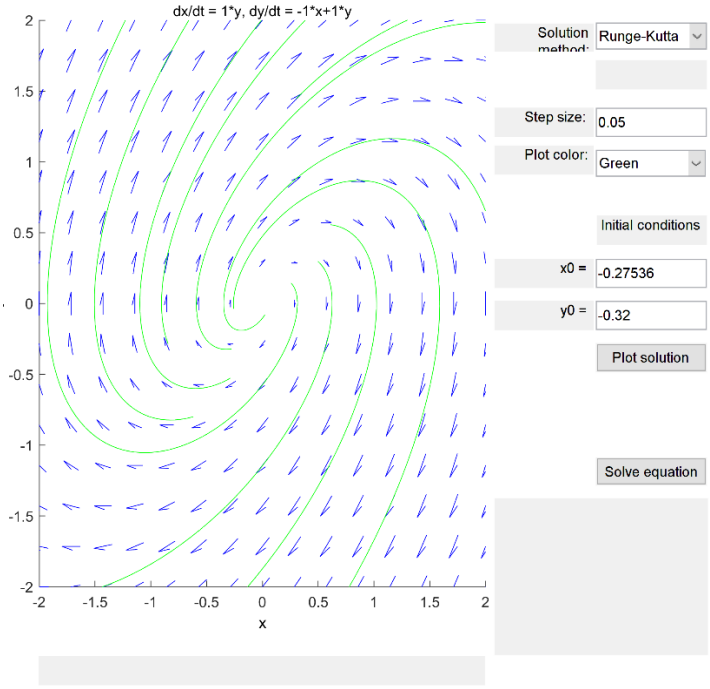
4.3: $\lambda_1 = -1,\ \lambda_2 = 2$ Unstable Saddle Point – distinct eigenvalues with one positive and one negative



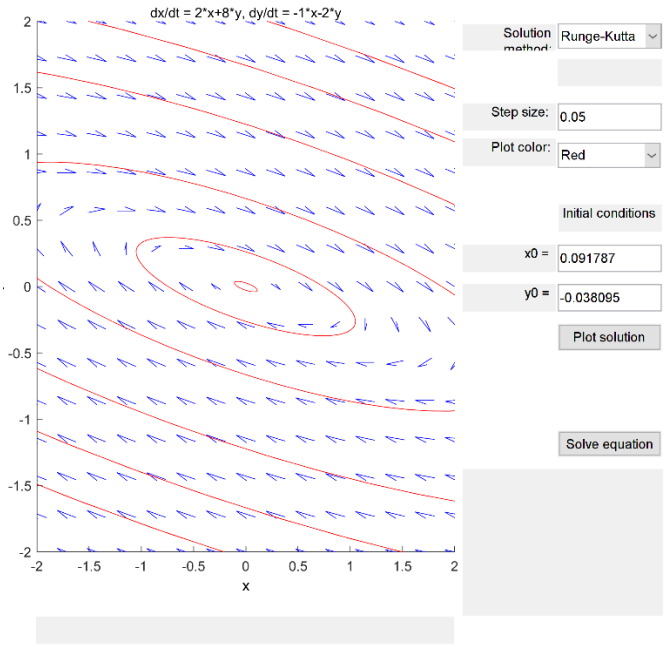
4.4: $\lambda_1 = 1,\ \lambda_2 = -2$ Unstable Saddle Point – distinct eigenvalues one positive and one negative



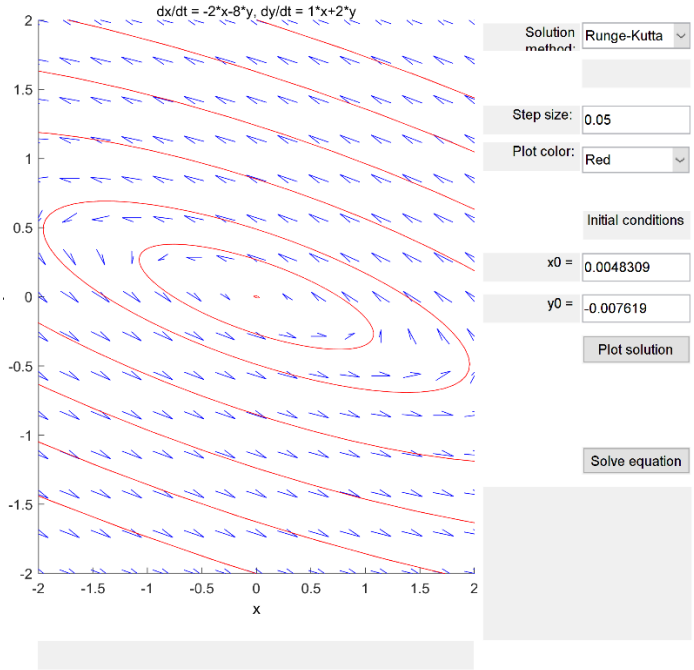
4.5: $\lambda_1 = -\frac{1}{2} + i\frac{\sqrt{3}}{2}$, $\lambda_2 = -\frac{1}{2} - i\frac{\sqrt{3}}{2}$ Nodal sink – distinct complex eigenvalues spiralling inwards (real part is negative)



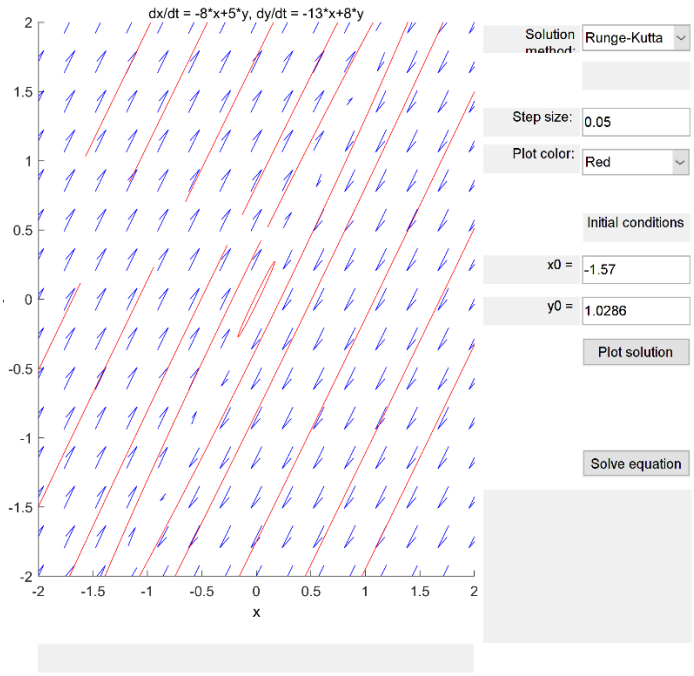
4.6: $\lambda_1 = \frac{1}{2} + i\frac{\sqrt{3}}{2}$, $\lambda_2 = \frac{1}{2} - i\frac{\sqrt{3}}{2}$ Unstable nodal source – distinct complex eigenvalues – spirals outwards as real part is positive



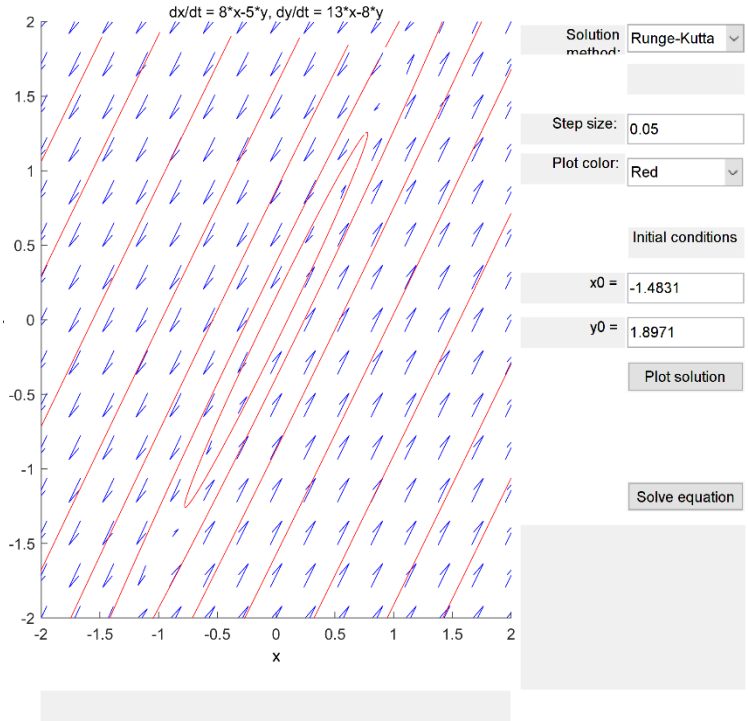
4.7: $\lambda_1 = 2i,\ \lambda_2 = -2i$ Stable center clockwise – no real component in the eigenvalues



4.8: $\lambda_1 = -2i,\ \lambda_2 = 2i$ Stable center counter-clockwise – no real component to eigenvalues



4.9: v$\lambda_1 = i,\ \lambda_2 = -i$ Clockwise stable center – no real component to eigenvalues



4.10: $\lambda_1 = i,\ \lambda_2 = -i$ Counter-clockwise stable center – no real component to eigenvalues