Applied Mathematics 224 - Assignment 1

Adam Menne - 24942901

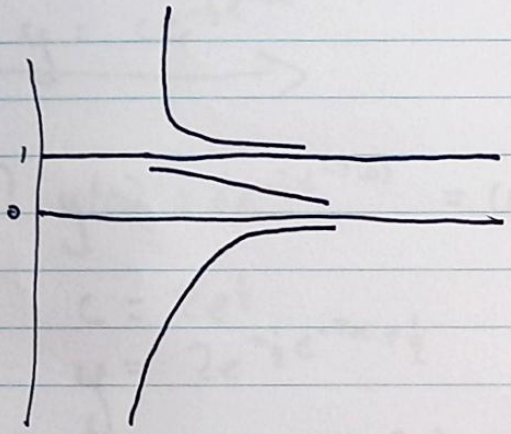
Problem 1

a) $-p^3 + 2p^2 - p = 0$

$-p(p^2 - 2p + 1) = 0$

$-p(p-1)^2 = 0$

$x = 0$ and $x = 1$



$x = 0$ Stable

$x = 1$ Semi-stable

Problem 2

a) $y' = e^{-2x} y$

$$\frac{y'}{y} = e^{-2x}$$

$$\int \frac{y'}{y}\,dx = \int e^{-2x}\,dx$$

$$\log(y) = -\tfrac{1}{2} e^{-2x} + C$$

$$y = e^{-\frac{1}{2}e^{-2x} + C}$$

$$y = Ce^{-\frac{1}{2}e^{-2x}}$$

b) $y(0) = Ce^{-\frac{1}{2}e^{-2(0)}} = Ce^{-\frac{1}{2}} = 2$

$$C = 2e^{\frac{1}{2}}$$

$$y = 2e^{-\frac{1}{2}e^{-2x} + \frac{1}{2}}$$

$$y = 2e^{\frac{1}{2}(1 - e^{-2x})}$$