

$$\begin{aligned}
G1 &:= 2 & G2 &:= 2 & C1 &:= 5 & C2 &:= 5 \\
G &:= \begin{bmatrix} G1 & 0 \\ 0 & G2 \end{bmatrix} & C &:= \begin{bmatrix} C1 & 0 \\ 0 & C2 \end{bmatrix} & G &= \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix} & C &= \begin{bmatrix} 5 & 0 \\ 0 & 5 \end{bmatrix} \\
y(v) &:= \begin{bmatrix} \tanh(v_1) \\ \tanh(v_2) \end{bmatrix} & v1 &:= \begin{bmatrix} 0.5 \\ 0.25 \end{bmatrix} & v2 &:= \begin{bmatrix} -0.5 \\ 0.5 \end{bmatrix} \\
y1 &:= y(v1) & y2 &:= y(v2) \\
y1 &= \begin{bmatrix} 0.462117 \\ 0.244919 \end{bmatrix} & y2 &= \begin{bmatrix} -0.462117 \\ 0.462117 \end{bmatrix}
\end{aligned}$$

Now need to let v_3 be variable and choose it to give a symmetric W
Define an unknown v_3 as v_x

$$v_x(x1, x2) := \begin{bmatrix} x1 \\ x2 \end{bmatrix} \quad y_x(x1, x2) := \begin{bmatrix} \tanh(x1) \\ \tanh(x2) \end{bmatrix}$$

The equation to solve is $W(y1 - y_x, y2 - y_x) = G(v1 - v_x, v2 - v_x)$

$$Y(x1, x2) := \begin{bmatrix} y1_1 - y_x(x1, x2)_1 & y2_1 - y_x(x1, x2)_1 \\ y1_2 - y_x(x1, x2)_2 & y2_2 - y_x(x1, x2)_2 \end{bmatrix} \quad V(x1, x2) := \begin{bmatrix} v1_1 - v_x(x1, x2)_1 & v2_1 - v_x(x1, x2)_1 \\ v1_2 - v_x(x1, x2)_2 & v2_2 - v_x(x1, x2)_2 \end{bmatrix}$$

setup for solving for $x1$ given $x2$ to make W symmetric

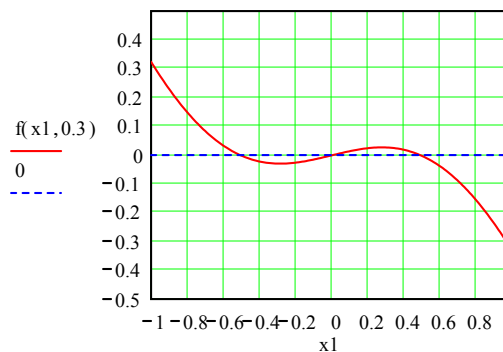
$$f1(x1) := G1 \cdot (v2_1 - x1) \cdot (y1_1 - \tanh(x1)) - G1 \cdot (v1_1 - x1) \cdot (y2_1 - \tanh(x1))$$

$$f2(x2) := G2 \cdot (v1_2 - x2) \cdot (y2_2 - \tanh(x2)) - G2 \cdot (v2_2 - x2) \cdot (y1_2 - \tanh(x2))$$

$$f(x1, x2) := f1(x1) - f2(x2)$$

$$x1min := -1 \quad x1max := 1 \quad x1inc := 0.01$$

$$x1 := x1min, x1min + x1inc .. x1max$$



Solve block to determine x1 given x2

Guess value: x2 := 0.3

x1 := 0.5

Given:

x10 := root(f(x1, 0.3), x1)

x1 := x10¹⁰ = 0.494563

Form weight matrix which should be symmetric

$W(x1, x2) := G \cdot V(x1, x2) \cdot (Y(x1, x2))^{-1}$

$$V(x1, x2) = \begin{bmatrix} 5.436955 \cdot 10^{-3} & -0.994563 \\ -0.05 & 0.2 \end{bmatrix}$$

$$Y(x1, x2) = \begin{bmatrix} 4.286609 \cdot 10^{-3} & -0.919948 \\ -0.046394 & 0.170805 \end{bmatrix}$$

$$W = \begin{bmatrix} 2.15568 & -0.035206 \\ -0.035213 & 2.1522 \end{bmatrix}$$

$W := W(x1, x2)$

$$v3 := \begin{bmatrix} x1 \\ x2 \end{bmatrix} \quad v3 = \begin{bmatrix} 0.494563 \\ 0.3 \end{bmatrix}$$

$$y3 := \begin{bmatrix} \tanh(x1) \\ \tanh(x2) \end{bmatrix} \quad y3 = \begin{bmatrix} 0.457831 \\ 0.291313 \end{bmatrix}$$

$$I := -W \cdot y3 + G \cdot v3 \quad I = \begin{bmatrix} 0.012446 \\ -0.010841 \end{bmatrix}$$

$$W \cdot y2 - G \cdot v2 + I \quad W \cdot y1 - G \cdot v1 + I = \begin{bmatrix} 0 \\ 0 \end{bmatrix} \quad W \cdot y3 - G \cdot v3 + I = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

This is $z(x) = -0.5 \ln((1-z)/(1+z))$

$$z(x) := -0.5 \cdot \ln \left[\frac{(1-x)}{(1+x)} \right] \quad n(y1) := \begin{bmatrix} z(y1_1) \\ z(y1_2) \end{bmatrix} \quad n(y2) := \begin{bmatrix} z(y2_1) \\ z(y2_2) \end{bmatrix}$$

$$n(y1) = \begin{bmatrix} 0.5 \\ 0.25 \end{bmatrix} \quad n(y2) = \begin{bmatrix} -0.5 \\ 0.5 \end{bmatrix}$$