**Task 2**

To find the max and min, we must apply the first and second derivatives.

Fa = 2a – 5 – 2b

Fb = 4b – 2a

Then we have 2 equations and 2 unknowns and solve for a = 5, b = 2.5

Now find Faa, Fbb, and Fabfor the second derivative test.

Faa = 2

Fbb = 4

Fab = -2

Now solve for H,

H = Faa \* Fbb \* Fab­2

H = 4

**Because H > 0 and Faa > 0, the value at (5, 2.5) is a minimum and there is no maximum because (5, 2.5) is the only critical point.**

**Task 3**

As approaches infinity, the value of scales any matrix it is multiplied with by , so because approaches infinity, the value of w goes to infinity.

**Task 4**

Start by solving the error for each function given the values. Our weights here are defined as w1x + w2. Plugging them into the equation on page 25, we get:

For w = [2.4, -1.5]

ED(w) = ½ [ (9.6 – [2.4, -1.5][5.3 5.3]T)2 + (4.2 – [2.4, -1.5][7.1, 7.1]T)2 + (2.2 – [2.4, -1.5][6.4, 6.4]T)2 ]

= ½ (23.3 + 4.8 + 12.7)

= 20.4

And for w = [3.1, 4.2]

ED(w) = ½ [ (9.6 – [3.1, 4.2][5.3 5.3]T)2 + (4.2 – [3.1, 4.2][7.1, 7.1]T)2 + (2.2 – [3.1, 4.2][6.4, 6.4]T)2 ]

After the first step, you find that the error for these weights are already higher than the error for previous weights.

ED(w) = ½ [ (-29.09)2 + … ]

= 402.5 + …

**So the function f(x) = 2.4x – 1.5 is the better line.**