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1. X1 = X2 = [1 2 3 4]
   Y = [2 4 6 8]
   Theta(i) = [0 1 .5]
   Theta(ii) = [3.5 0 0]

   Theta(i)
   h(x) = theta0 + theta1 * x1 + theta2 *x2
   M = 1 | h(x) = 0 + 1 + .5 = 1.5
   M = 2 | h(x) = 0 + 2 + 1 = 3
   M = 3 | h(x) = 0 + 3 + 1.5 = 4.5
   M = 4 | h(x) = 0 + 4 + 2 = 6
   $J(\theta) = \frac{1}{2*m} \sum_{i=0}^{m} (h(x^{(i)}) - y^{(i)})^2$ where m = 4
   So 1/8*((1.5 – 2)^2 +(3-4)^2+(4.5-6)^2 +(6-8)^2) = 1/8(.25 + 1 + 2.25 + 4) = 7.5/8 = .9375
   In the same manner for

   theta(ii)
   1/8((3.5 – 2)^2+(3.5 - 4)^2+(3.5 – 6)^2 +(3.5-8)^2) =
   1/8(2.25 + .25 + 6.25 + 20.25) = 29/8 = 3.625

   Values from Matlab
   Theta(i) : 0.9375
   Theta(ii) : 3.6250

2. h(x) same as above
   $\theta_i = \theta_i - \alpha * \frac{1}{m} \sum_{i=0}^{m} (h(x^{(i)}) - y^{(i)}) * x^{(i)}$
   Estimated with randomized initial theta
   1.05347505139782
   1.16812072037550
   -0.831879279624499
   Using [0 1 .5]
   Cost after 15 iterations
   6.55343154569144

   3. -6.21724893790088e-15

   1.00000000000000

   1.00000000000000

   The two estimations are not very close outside of the theta1 estimate the theta0 and 2 estimates vary greatly. It is likely that there were not enough iterations run for a proper prediction to be made, meaning a few thousand iterations would probably be the way to get a good estimate of theta values before calculating cost.

4. c : X 179x2, Y 179x1
   e : -5.55456842822722

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17.4347741687727
f : 10.868379564713631
g : 10.0270221477839, they compare very nicely this time, likely due to the higher learning rate and higher number of iteration, but also upon rerunning the program the numbers seem to stay generally in the same area, further proving the accuracy.
h: the accuracy of the prediction and the associated cost seems to get much better the closer alpha gets to persay .5, however on the last value of alpha (3), the graph indicates the cost is extremely high at the end, implying this value is much too high.

5. a : Mean 2000.68085106383 3.17021276595745 340412.659574468

   Stdev 794.702353533890 0.760981886780100 125039.899586401

   X : 47x3 Y : 47x1

   B : -0.000532593605886905

   1.49999981802759

   -0.500000181972407

   C : -.9437 -.2237

   Predicted price : $177,330.76