Q4

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2019459

Part 1

a. We can test this hypothesis by adding an extra term for male employees in the bias. So the new bias will be :-

$$b0_{new} = b0 + b0_m * X_M$$

where X_M will be 1 for male employees and 0 for female employees

So our new equation becomes $Wi = b0_{new} + b1Xi + ui$

Now we will predict wage for 2 sample which contain the same work experience information, but with different values for X_M, if the model predicts a higher wage for $X_M = 1$, then our hypothesis is correct.

b. Now since the slope is different we can test the new hypothesis by adding an extra term for male employees in the coefficients, ie, b1.
So new weights will be:-

$$b1_{new} = b1 + b0_m * X_M$$

where X_M will be 1 for male employees and 0 for female employees

So our new equation becomes $Wi = b0_{new} + b1_{new}Xi + ui$

Now we will predict wage for 2 sample which contain the same work experience information, but with different values for X_M, if the model predicts a higher wage for $X_M = 1$, then our hypothesis is correct.

c. Since the relationship between experience and wage is upward slope, that means $dWi del(Wi)/del(Xi)$ is always positive

Part 2

Ridge regression uses L2 regularisation penalty to shrink large coefficients. This is done to prevent the model from overfitting on the training data. Larger weights may perform well on

some specific training data but can fail on new testing data, penalising large weights prevents this from happening.

Part 3