Multimedia 1

Interval for the mean response is

$$\hat{y}_{x_0} \pm t_{\frac{\alpha}{2}, df} \times \sqrt{(x_0^T (X^T X)^{-1} x_0)\hat{\sigma}^2}$$

It is easy to calculate $\hat{y}_{x_0}$. This turns out to be 44.60.

Right. This is just plugging the numbers into the regression equation itself.

Use tinv function in Excel with inputs 0.05 and 26 to get $t_{.025, 26} = 2.06$.
C.L df

Good to know the excel function. I looked the value up on a t-table and got the same answer.

Now, we give you $\sqrt{(x_0^T (X^T X)^{-1} x_0)\hat{\sigma}^2}$ to be 1.34 and so simply plug in the numbers as follows

This 'hot mess' was given to us. It is just the standard error of the sample; which is closely related to the standard deviation, right? If I recall correctly the difference between the two is negligible as long as the sample size exceeds 30 observations.

$$44.60 \pm 2.06 \times 1.34$$ {you do the math.}

44.60 +- 2.76 Got it! Thanks.

The prediction interval is given by

$$\hat{y}_{x_0} \pm t_{\frac{\alpha}{2}, df} \times \sqrt{\hat{\sigma}^2 + \hat{\sigma}^2 x_0^T (X^T X)^{-1} x_0}$$

we know $\hat{y}_{x_0} = 44.60$

$t_{\frac{\alpha}{2}, df} = 2.06$

$\hat{\sigma}^2 x_0^T (X^T X)^{-1} x_0 = 1.34^2$

Thank you for this step. I got my algebra confused. Oy! The texts show the preceding iteration SQRT (sigma^2 *(1+ x etc)). So I assume that the standard error should be squared in the equation shown.

and from earlier slides $\hat{\sigma}^2 = (2.31)^2$ {rmse^2}

So, simply substitute the numbers and solve.

40.66 +- 2.06 * SQRT (2.31^2 + 1.34^2)
40.66 +- 2.06 * SQRT (5.34 + 1.80)
40.66 +- 2.06 * SQRT (7.14)
40.66 +- 2.06 * 2.67
40.66 +- 5.50