1 Question

The following table contains the quantity and the price of a barrel of oil for twelve periods. Price is in dollars and quantity is in thousand of barrels.

period	World Q	oil price
1	61440	145.43
2	62083	145.21
3	62769	134.41
4	64494	121.29
5	66023	114.24
6	67769	107.88
7	69652	103.73
8	70206	94.62
9	73530	86.70
10	74540	75.07
11	76258	73.26
12	75502	67.35

(i) Estimate the relationship between Quantity Q and price using OLS; that is, obtain the intercept and slope estimates in the equation

$$\widehat{Q} = \hat{\alpha}_0 + \hat{\alpha}_1 price$$

```
SEE EXCELL FILE oilDemand_solutionsAssign3.xls
FOR ALL CALCULATIONS

IN YELLOW YOU SEE ALPHA0 hat=89317.6809, the  INTERCEPT
IN YELLOW YOU SEE ALPHA1 hat =-195.0426  SLOPE

IN YELLOW YOU ALSO SEE R SQUARED=0.974550057 obtained as  1- (SSR/SST of q)=1-(8179369.466/3213904
```

Comment on the direction of the relationship.

alpha1 hat is negative

Does the intercept have a useful interpretation here? Explain.

alpha zero hat is total quantity purchased when price is zero. if oil were free, this is how much Q would be consumed per period.

How much higher is the Quantity predicted to be if the price is increased by 25 dollars?

quantity increases by (25 * -195.0426), that is quantity drops by -4876.066049 thousand barrels of oil, holding everything else contant (ceteris paribus)

(ii) Compute the fitted values and residuals for each observation, and verify that the residuals (approximately) sum to zero.

see excell part in green

(iii) What is the predicted value of Quantity when price = 100?

quantity hat =89317.6809 -195.0426 *100=69813.4167 thousand barrels oil

(iv) How much variation in Quantity for these twelve periods is explained by price? Explain.

R2= SSE/SST= 1- (SSR/SST)=1-(8179369.466/321390487.7)=0.97455, so 97.455 percent.