1 Is there a difference between $\hat{y}$ and $\bar{y}$?

I refer to $\hat{y}_i$ as the predicted value from the fitted regression model for the ith observation. $\bar{y}$ is the sample mean.

2 A list of all notations and what they represent?

3 What is the parameter we are trying to find in the ratio linear regression?

4 Why are there t-statistics and F-statistics given as outputs of a regression model? Why are we analyzing t if the F is what is usually reported for regression models?

5 Kind of confused about the overall goal of a regression... Is it just a faster way to get all the individual outputs (like the estimates, p-value, standard error, etc.), or does it have some extra use in and of itself?

6 Why is south estimate log(theta hat), why isnt it log(u) + log (theta)

7 Why is the df n-p and not n1+n2-1?

8 When calculating residual ($y_i - \hat{y}_i$), is $\hat{y}_i$ the sample mean for the entire sample, or the sample mean for North and for South? And if it's the latter, are you subtracting $\hat{y}_i$ for North from all the North y's and $\hat{y}_i$ for South for all the South y's, or subtracting both $\hat{y}_i$ for each y?