The overall F test (in the ANOVA table for SLR & also the last line in the summary output) and the t-test on the slope coefficient (for gestation, the X variable) are equivalent for SLR and they both answer the question

"Is Y (protein) related to X (gestation)?"

They are not the only inferences we can make using the summary output.

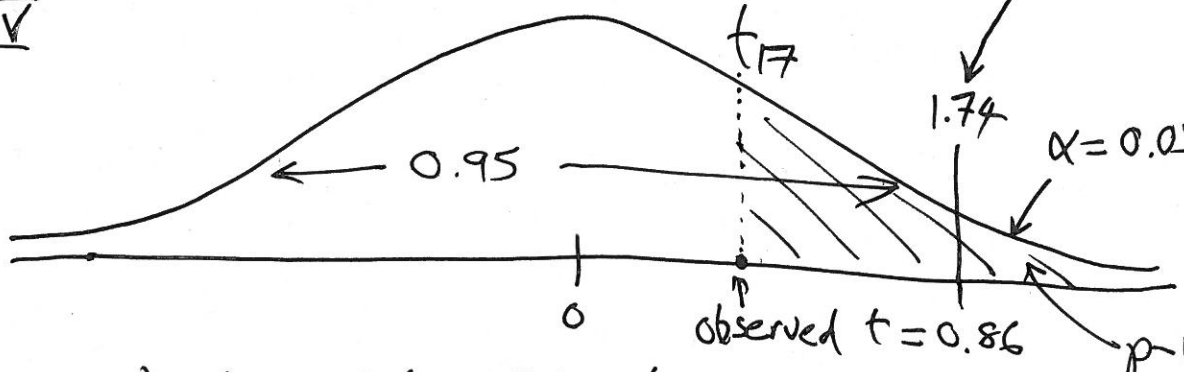
Say the (a priori) question had been "do the protein levels increase by more than 0.02 mg/ml for each week of gestation?"

Step I $H_0: \beta_1 = 0.02$ $H_A: \beta_1 > 0.02$

Step II $t = \dfrac{\hat{\beta}_1 - \beta_1 | H_0}{se(\hat{\beta}_1)}$ ← these are still the values given in the summary output

Step III $\alpha = 0.05$; reject $H_0$ if observed $t > t_{17}(0.95)$ $\hat{=} qt(0.95, 17)$

Step IV




Step V As observed $t = 0.86 \not> 1.74 = t_{17}(0.95)$

OR as $p = 0.20 > \alpha = 0.05$

do not reject $H_0$ & conclude that the expected increase in protein levels is of the order of 0.02 mg/ml for each additional week of gestation, but is NOT significantly greater than that

# T-test on the intercept coefficient

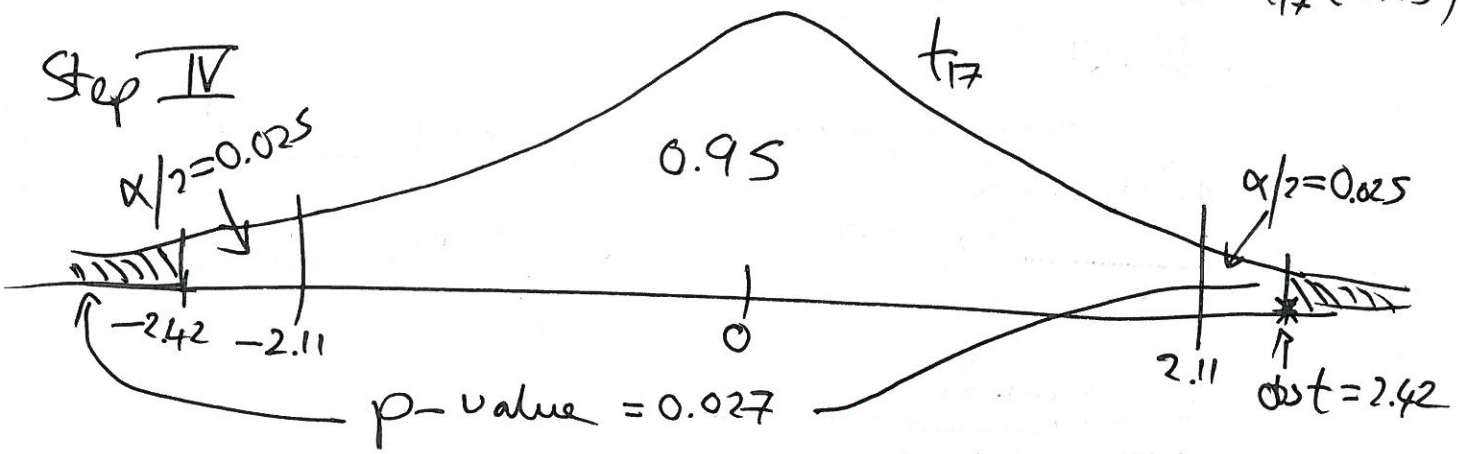
**Step I** $H_0 : \beta_0 = 0$ vs $H_A : \beta_0 \neq 0$

**Step II** $$t = \frac{\hat{\beta}_0 - 0}{se(\hat{\beta}_0)} \sim t_{n-2}$$

$$se(\hat{\beta}_0) \triangleq \sqrt{\frac{1}{n} + \frac{\bar{x}^2}{S_{xx}}}$$

**Step III** $\alpha = 0.05$ ; reject $H_0$ if observed $t < t_{17}(0.025)$ or observed $t > t_{17}(0.975)$

**Step IV**




**Step V** As $p = 0.027 < \alpha = 0.05$
reject $H_0$ & conclude $H_A : \beta_0 \neq 0$