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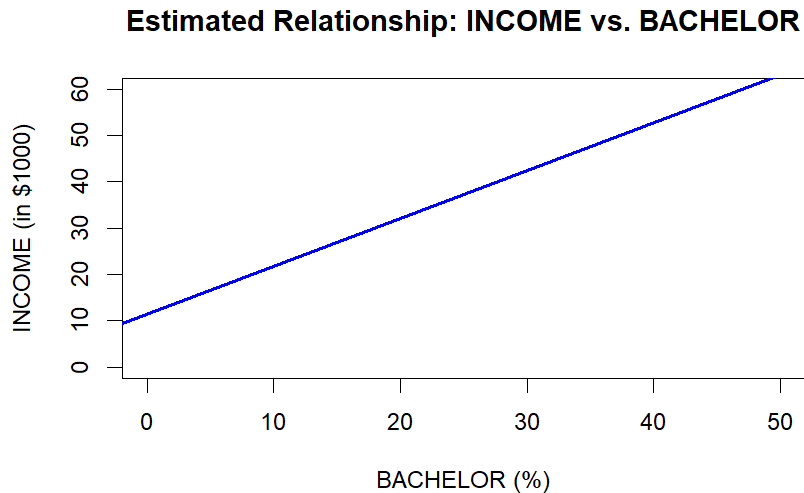
HW0310

Question 3.01

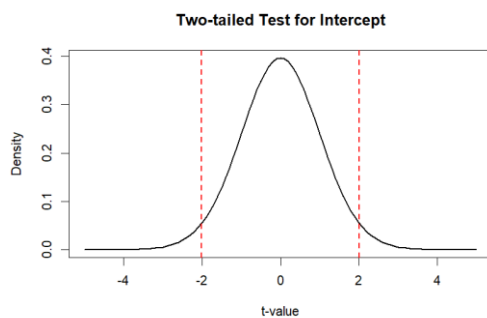
- (a) $H_0: \beta_2 = 0$ and $H_1: \beta_2 > 0$
- (b) The test statistic is $b_2 = \text{se}(b_2) \sim 6.09$. If the null hypothesis is true t should $>$ critical value at least 10% level $t = 1.65$
- (c) Under the alternative hypothesis the center of the t -distribution is pushed to the right.
- (d) We will reject the null hypothesis and accept the alternative if $t \geq 2.388$. We fail to reject the null hypothesis if $t < 2.388$
- (e) The calculated value of the test statistic is $t = 6.09$. We reject the null hypothesis that there is no relationship between the number of medals won and GDP and we accept the alternative that there is positive relationship between the number of medals won and GDP.

Question 3.07

- a) Estimated intercept (alpha) = 11.51632
- b) Sketch the estimated relationship. The estimated relationship between INCOME and BACHELOR is increasing at a constant rate.



- c) Standard Error of the slope coefficient = 0.09572093
- d) t-statistic for testing intercept = 10 is: 0.567485
- e) Plot



- f) Answer

```
> print(lower_99)
[1] 0.7724725
> print(upper_99)
[1] 1.285532
```

- g) We fail to reject H0: beta = 1

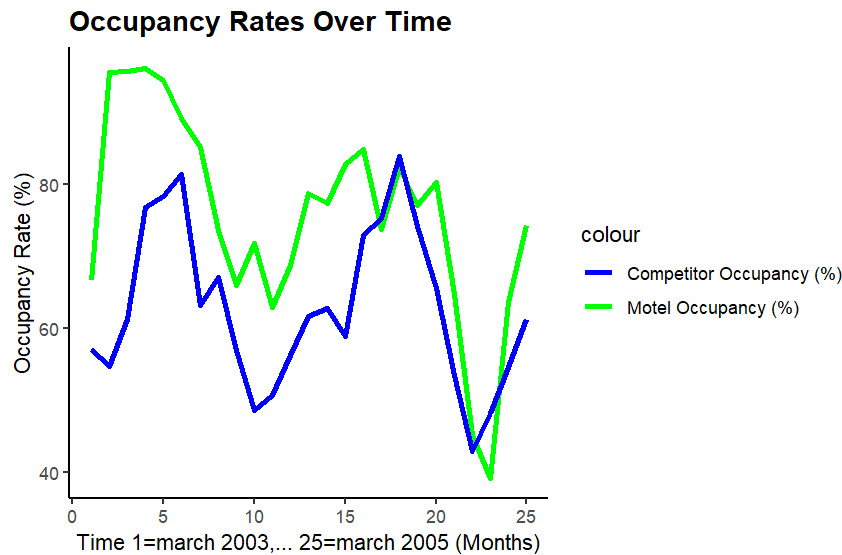
```
> t_f <- (slope_est - 1) / std_error_slope
> print(t_f)
[1] 0.302964
```

Question 3.17

- (a) The calculated value of the t-statistic is $t = 4.125 > t = 1.96$ (5% significant), which falls in the rejection region, so we reject the null hypothesis and accept the alternative.
- (b) 95% CI for expected WAGE (rural) when EDUC = 16: [21.74 , 26.1]
- (c) 95% CI for expected WAGE (urban) when EDUC = 16: [27 , 30.2]
- (d) The calculated value of the t-statistic is $t = -2.70$, which falls in the rejection region.

Question 3.19

a) Plot



Estimate model:

Call:

```
lm(formula = motel_pct ~ comp_pct, data = motel)
```

Residuals:

Min	1Q	Median	3Q	Max
-23.876	-4.909	-1.193	5.312	26.818

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	21.4000	12.9069	1.658	0.110889
comp_pct	0.8646	0.2027	4.265	0.000291 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 11.02 on 23 degrees of freedom

Multiple R-squared: 0.4417, Adjusted R-squared: 0.4174

F-statistic: 18.19 on 1 and 23 DF, p-value: 0.0002906

95% CI for beta2 (slope): 0.4453 to 1.284

b) 90% CI for expected MOTEL_PCT when COMP_PCT = 70 : [77.382 , 86.467]

c) $t = 4.27$, this value is in the rejection region

d) $t = -0.67$ which is in the non-rejection region

e) For observations 17-23 all the residuals are negative but one.

