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1.a) $\log(wage_i) = 0.4436 + 0.0709\,educ_i + 0.3898\,exper_i - 0.006\,exper_i^2 + 0.1925\,union_i - 0.4422\,female_i + u_i$

Based on the coefficient of $educ_i$, if a person has one more year of schooling, the wage would increase by $100 \times 0.0709\%$ or 7.09% (based on log-lin interpretation)

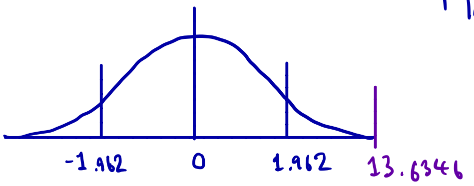
Test if $0.0709 = 0$ at $\alpha = 0.05$

$H_0: 0.0709 = 0$ $\quad t_{cal} = \dfrac{0.0709 - 0}{0.0052} = 13.6346$

$H_1: 0.0709 \neq 0$

$df = 1260 - 6 = 1254$ $\quad T_{upper} = 1.962$

$T_{lower} = -1.962$



(Reject H_0)

Ans Education has a significant impact on log of wage at 95% significant level

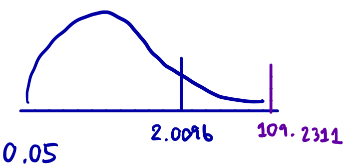
1.b) use f test

$H_0 \to \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = 0$

$H_1 \to$ otherwise

$F_{cal} = \dfrac{ESS/(k-1)}{RSS/(n-k)} = \dfrac{168.6972/7}{276.2828/1252} = 109.2311$

$F_{upper}(7, 1252) = 2.0096$



Ans The regression is significant at $\alpha = 0.05$

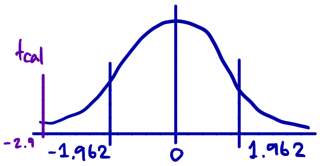
1.c) use t test $\quad \alpha = 0.05 \quad df = 1{,}252 \quad t_{crit} = \pm 1.962$

$H_0 \to \beta_7 = 0$

$H_1 \to \beta_7 \neq 0$

$t_{cal}(\beta_7) = \dfrac{-0.1388 - 0}{0.0478}$

$= -2.9$

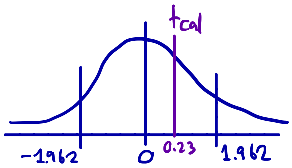


$H_0 \to \beta_8 = 0$

$H_1 \to \beta_8 \neq 0$

$t_{cal}(\beta_8) = \dfrac{0.007 - 0}{0.0303}$

$= 0.23$



Ans Physical attractiveness has an impact on log of hourly wage but only for below average attractiveness. Above average, physical attractiveness has no impact on log of wage/hr.

1.d) No, because above average, physical attractiveness has no impact on log of wage/hr. The woman with average attractiveness and another with above average, both of them will receive the same log of wage/hr. at $\alpha = 0.05$

2.a) Yes, for example; $-2835 area_i \rightarrow$ the area (municipality) = 0, otherwise = 1 meaning that households outside municipal areas will have less expenditure, which make sense because the cost of living outside municipal areas is cheaper. And $+881 child_i$ make sense because more children almost always correlate to more expenditure.

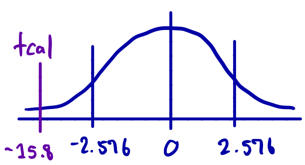
2.b) use t test $df = 14{,}908 - 3 = 14{,}905$ $\alpha = 0.01$

$t_{crit} = \pm 2.576$

$H_0 \rightarrow 2835 = 0$

$H_1 \rightarrow 2835 \neq 0$

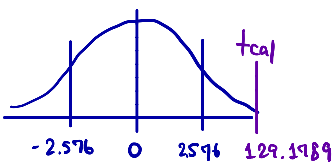
$t_{cal} = -15.8$



$H_0 \rightarrow 881 = 0$

$H_1 \rightarrow 881 \neq 0$

$t_{cal} = 6.82$



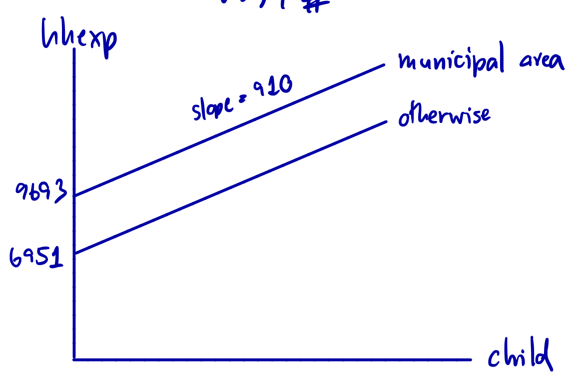
<u>Ans</u> β_2 or 2835 is significantly different from zero at $\alpha = 0.01$

β_3 or 881 is significantly different from zero at $\alpha = 0.01$

2.c) $hhexp = 9736 - 2835 area_i + 881 child_i$

$hhexp = 9736 - 2835(1) + 881(3)$

$= 9334$ #



3.a) $VIF = \frac{1}{1-r^2}$ VIF high $\rightarrow r^2 \uparrow$ close to 1 $\rightarrow$ more multicolinearity

<u>Ans</u> age & agesq due to high r^2, which means higher coefficient of correlation between the two variables and higher multicolinearity

3.b) No, because there is no clear correlation between $weekoti$ and $\hat{u}_i^2$

3.c) $H_0 \rightarrow$ Homoscedaticity

$H_1 \rightarrow$ Heteroscedaticity

$$F_{cal} = \frac{R^2_{\hat{u}_i^2}/k}{(1-R^2_{\hat{u}_i^2})/(n-k-1)} = \frac{0.0184/5}{(1-0.0184)/(2032-5-1)} = 7.6$$

$F_{crit(5,2026)} = 2.2141$

$F_{cal} > F_{crit} \rightarrow$ Reject homoscedaticity

<u>Ans</u> Heterodaticity is presant