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6.3.i. $\frac{d\widehat{rdintens}}{d\,sales} = 0$

$0.0003 - 0.000000014\,sales = 0$

$0.0003 = 0.000000014\,sales$

so the point of marginal effect of sales on rdintens is at 21428.57143

6.3.ii. $t_{stat\ of\ \hat{\beta}_{sales^2}} = \frac{-0.000000007}{0.0000000037} = -1.89$

$t_{0.09,29} = -1.7$, so it is significant if we consider the one-sided $H_0: \beta_1 < 0$ at 5% significance level. So we should keep the model in its quadratic model.

6.3 iii. From sales to salesbil, we divide sales by 1000. Thus, we need to multiply the coefficient and se by 1000.

$(0.0003)(1000) = 0.3 \rightarrow$ coefficient

$(0.00014)(1000) = 0.14 \rightarrow$ se

For $salesbil^2$, we divide by 1,000,000 to get $sales^2$ to $salesbil^2$.

$(0.000000007)(1{,}000{,}000) = 0.007 \rightarrow$ coefficient

$(0.0000000037)(1{,}000{,}000) = 0.0037 \rightarrow$ se

R^2 remains the same

$$\widehat{rdintens} = \underset{(0.429)}{2.673} + \underset{(0.14)}{0.3}\,salesbil - \underset{(0.0037)}{0.007}\,salesbil^2$$

$n = 32$, $R^2 = 0.7484$

6.3 iv. I like the transformed equation more because its easier to read with less zeroes.

7.1 i. As the coefficient for men is 87.75, it means that a man is estimated to sleep 87.75 minutes more per week than a woman. The t-stat for men is 2.56 which is near to $t_{0.005,\infty} = 2.58$, so it is strong evidence

7.1 ii. $t_{stat} = \frac{-0.163 - 0}{-0.018} = 9.056$ which is significant. The coefficient shows that if there is an additional hour has been spent working, the time to sleep will be lessened by $(0.163)(60) = 9.78$ minutes

7.1iii. To get R^2_r, we need to estimate the model by removing age and age^2 as they both have no impact.

7.8.i. $\log(wage) = \beta_0 + \beta_1 usage + \beta_2 educ + \beta_3 exper + \beta_4 exper^2 + \beta_5 female + u$

With this equation $100 \cdot \beta_1$ will be the approximate percentage change in wage when marijuana usage increases by one time a month.

7.8ii. $\log(wage) = \beta_0 + \beta_1 usage + \beta_2 educ + \beta_3 exper + \beta_4 exper^2 + \beta_5 female + \beta_6 female \cdot usage + u$

$H_0: \beta_6 = 0$

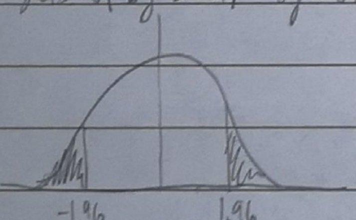
7.8iii. If our base is nonuser, we can create dummy variables: lghtuser, moduser, and hvyuser.

$\log(wage) = \beta_0 + \delta_1 lghtuser + \delta_2 moduser + \delta_3 hvyuser + \beta_2 educ + \beta_3 exper + \beta_4 exper^2 + \beta_5 female + u$

7.8iv. null hypothesis is $H_0: \delta_1 = 0, \delta_2 = 0, \delta_3 = 0$ for $q = 3$ restrictions. With n sample size, the df of the unrestricted model is $n-8$ to get the critical value from $F_{q,n-8}$ distribution.

7.8v. Error term has factors that can affect wages or related to marijuana usage. Thus, we should hold other factors fixed and collect more data or include more factors.

7.11i. The coefficient of male of 3.83 means that if one male student increases, the average class score goes up by 3.83% by holding other factors constant.

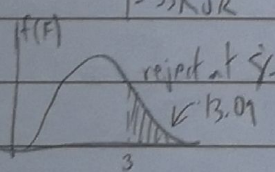


95% CI for male $= 3.83 \pm 1.96(0.74)$

$= 5.2804, 2.3796$

so the CI excludes 0 because it doesn't lie between the two values

7.11.ii. $F = \frac{SSR_{UR} - SSR_r / q}{1 - SSR_{UR}} = \frac{(0.349 - 0.329)/2}{1 - 0.349 / 836-3-1} = \frac{0.01}{0.000764} = 13.09$



We reject H_0 at 5% so there is gender difference at 5% significance level. It is imprecise because our error term can be quite large with a low number of variables. If $H_0: \beta_{male} = \beta_{male \cdot colgpa} = 0$, we can conclude gender won't cause a difference in score.

7.11.iii. The coefficient of male is closer than in the last equation to that of the second equation because if we substitute the average colgpa of 2.81 in the last equation, 0.479 male (colgpa − 2.81) will be eliminated. This causes less fluctuations and offers a more precise prediction.

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7.C4.i. β_1, β_3, and β_6 are expected to have negative effect, because when they increase colgpa decreases. β_2 is in quadratic form and β_5 is a dummy variable so we are uncertain.

7.C4.ii $\widehat{colgpa} = 1.241 - 0.059\,hsize + 0.00468\,hsize^2 - 0.0132\,hsperc + 0.00165\,sat + 0.155\,female + 0.169\,athlete$

Athletes are predicted to score better than non athletes by 0.169 at 5% significance level.

7.C4.iii. If we drop sat, athlete's coefficient becomes 0.0054 because we don't take not of sat scores. However, athletes will still do better than non-athletes

7.C4.iv. The coefficient of 0.175 means female athletes score 0.175 points higher than female nonathlete. It is significant at 5% level because $t = 2.08 > 1.96$

7.C4.v. Even with the inclusion of gender, the outcome is almost the same, so gender should not be too impactful on colgpa.