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HW

Ch6 - Q3.

i). At the point where $\frac{\hat{\beta}_1}{2(\hat{\beta}_2)} = \frac{0.003}{0.00000014} \approx 21,428.6$ where it is the turn around point

ii) At the 5% significant level, p-value = 0.36 and t-statistic = −1.89 which is significant [one-sided]. Thus, we should keep the quadratic term.

iii) The corresponding coefficient and SD, both get multiplied by 1000 due to $\frac{sales}{1000}$. Thus, salesbils^2 means the coefficient will be multiplied by 1,000,000 which equal to 0.007. However, for the R^2, nothing changed b/c it stills at 0.1484.

$\therefore \widehat{rdintens} = 2.613 + 0.3 salesbil - 0.007 salesbil^2$ where $n = 32, R^2 = 0.1484$.

iv). I would prefer the equation that already adjusted for the different scale and contain less decimal digits. Therefore, $\widehat{rdintens} = 2.613 + 0.3 salesbil - 0.007 salesbil^2$ should be used.

ch 7

Q1 - i) It clearly shows that men sleep more than women for about 87.75 mins due to the coefficient of male. In addition, the t-statistic of male is closely to the 1% critical value [two-sided] [2.58] at about $\frac{87.75}{34.33} = 2.56$.

ii) 0.163(60) = 9.8 mins needed to payoff in order for 1 more hour of work. Since the t-statistic $= \frac{0.163}{0.018} = -9.0$, so it is significant.

iii) I think R^2 is needed to ensure that whether age has impact on sleeping or not. Result, age / age^2 are both have no effect since they both equal to zero

Q8.) - i) $\log(wage) = \beta_0 + \beta_1 usage + \beta_2 educ + \beta_3 exper + \beta_4 exper^2 + \beta_5 female + U$. Where $10\beta_1$ is the example of the change in percentage in wage when the used of marijuana increased by one time in a month.

ii) $H_0: \beta_6 = 0$. Where we add β_6 to the equation. $\log(wage) = \beta_0 + \beta_1 usage + \beta_2 educ + \beta_3 exper + \beta_4 exper^2 + \beta_5 female + \beta_6 female \cdot usage + U$.

iii) $\log(wage) = \beta_0 + \delta_1 lightuser + \delta_2 moduser + \delta_3 hvyuser + \beta_2 educ + \beta_3 exper + \beta_4 exper^2 + \beta_5 female + U$.

iv). We will have $F_{4,n-8}$ as critical value b/c [df in unrestricted model - denominator df in F distribution. Therefore, $H_0: \delta_1 = \delta_2 = \delta_3 = 0$.

v.) There are many others that can effect the use marijuana such as family background and environment that they live in which can make the error term exist.

Q11). i) yes, it exclude zero.

ii) We can set $H_0: \beta_{male} = 0$ and $\beta_{male \cdot colgpa} = 0$. Then, compute F-stat $= \left[\frac{0.349 - 0.329}{2(1-0.0349)} \Big/ 852\right] = 13.09 > 3.01$. Therefore we reject H_0 that there is no gender difference.

iii) Because of the R^2 are the same, even with colgpa (−2.83) but when square the answer is the same.

computer q. (4)

i) It is unclear that whether male and female have different gpa or not but the extremely clear are the hsperc [β_3] that the smaller = the better for student, since $\beta_3 < 0$ and $\beta_4 > 0$.

ii) $n = 437$, $R^2 = 0.293$. t-statistic $= \frac{0.169}{0.042} = 4.26$ which is significant. when equation is

$$\widehat{colgpa} = 1.396 - 0.0568\,hsize + 0.00467\,hsize^2 - 0.0132\,hsperc + 0.00165\,sat + 0.175\,femath + 0.013\,maleath - 0.155$$

iii) When sat dropped, the coefficient of athlete become not different from zero ≈ 0.0054 because atheletes usually score lower than non-atheletes. Part ii) indicates that, when we account the SAT differences, atheletes do better than non atheletes. Thus, there is no differences even we drop sat from model.

iv).

$$\widehat{colgpa} = 1.396 - 0.0568\,hsize + 0.00467\,hsize^2 - 0.0132\,hsperc + 0.00165\,sat + 0.175\,femath + 0.013\,maleath - 0.155\,malenonath$$

The coefficient of female athlete shows that colgpa $= 0.175$ more than female with nonathelete for female athelete. Therefore, in this case, $t = 2.08$ at 5% level of significant level against two sided. Thus, there is no difference.

v.) I think, no b/c the effect on sat on colgpa differ by gender is no different when we add ii) or iv) to equation.