Stats Sample 1.

Q1, Q2(a, c) are same as 2009 S1 paper

Q2

b) i) $n = 1600$

$\hat{p} = \frac{8}{1600} = 0.005$

CI: $\hat{p} \pm z_{1-\frac{\alpha}{2}} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$

$= 0.005 \pm 2.575 \sqrt{\frac{0.005(1-0.005)}{1600}}$

$= 0.005 \pm 4.5406 \times 10^{-3}$

$= [4.59 \times 10^{-4} \quad 9.54 \times 10^{-3}]$

ii) $n = \left(\frac{z_{1-\frac{\alpha}{2}}}{2e}\right)^2 \pi(1-\pi)$

For 99% confidence, the max. π will be 9.54×10^{-3}

$n = \left(\frac{2.575}{2 \times 0.008}\right)^2 \times 9.54 \times 10^{-3} \times (1 - 9.54 \times 10^{-3})$

$= 978.95$

25901

Q3. a) i) $H_0 : \beta_1 = 0$ against $H_a : \beta_1 \neq 0$

ii) observed value $t_0 = -7.8$, following t_{28} distribution.

$p\text{-value} = P(|T| > |-7.8|) \times 2$

$< 2 \times 0.005$ (from table)

$= 0.001$

$p\text{-value} < 0.001 < 0.01$

∴ Reject H_0, that is ppu has significant impacts on the Ratio.

b) i) $R^2 = 68.5\%$

ii) correlation $= -\sqrt{0.685} = -0.8276$

c) i) 95% CI for $\beta_1 = \hat{b}_1 \pm t_{n-2;\,1-\frac{\alpha}{2}} \left(\frac{S}{\sqrt{S_{xx}}}\right)$ → SE coeff.

$= -0.00001484 \pm t_{28;\,0.975} \times 0.00000019$

$= -0.00001484 \pm 2.048 \times 0.00000019$

$= [-1.873 \times 10^{-5},\ -1.095 \times 10^{-5}]$

ii) Ratio $= [1 - 1.873 \times 10^{-5} \times 100,\ 1 - 1.095 \times 10^{-5} \times 100]$

$= [0.9981\ \ 0.9989]$

d) 200 ~ 1200

e) i) 2nd one : Residual versus fits.

Constant σ assumption is supported because dots are randomly spread out. ie. No particular pattern can be observed.

of the ε

ii) 0.00314906

f) 95% CI for $\beta_0 = \hat{b}_0 \pm t_{n-2;\,1-\frac{\alpha}{2}}\, S \sqrt{\frac{1}{n} + \frac{\bar{X}^2}{S_{xx}}}$

$= 1.0000 \pm t_{28;\,0.975} \times$ SE coef

$= 1.0000 \pm 2.048 \times 0.00131$

$= 1.0000 \pm 2.68288 \times 10^{-3}$

$= [0.99732\ \ 1.00268]$