Econ Assignment - Bivariate Regression

1) $\widehat{WAGE} = 12.52 + 2.12 \times MALE$

$R^2 = 0.06$
$SER = 4.2$,

a) The estimated gender pay gap is 2.12/hour, as that is the coefficient for male.

b) The p-value is: $2\Phi(-|t^{act}|)$ where

$$t^{act} = \frac{\hat{B}_1 - 0}{SE(\hat{B}_1)} = \frac{2.12}{0.36}$$

$$= 5.89$$

$$p\text{-value} = 2\Phi(-5.89) = 0$$

Since p-value is less than 0.05, we can assume that the null hypothesis ~~H~~ is not true.

c) The 95% confidence interval is:

$$2.12 - 1.96 \times 0.36 \leq B_1 \leq 2.12 + 1.96 \times 0.36$$

d) The sample average wage of women is 12.52 (B_0)
The sample average wage of men is ~~£~~ 14.64

$$(\underset{B_0}{12.52} + \underset{B_1}{2.12})$$

e) The original equation is

$$Wage = \beta_0 + \beta_1 \times Male,$$

where ~~β_1~~ ~~is~~ Male is a boolean variable denoting the gender.

~~These equation~~
The equation expected in the given question is

~~$wage = 2\beta_0$~~

$$Wage = \alpha_0 + \alpha_1 \times Female$$

The relationship between the two variables is as follows:

Population mean wages for women $= \beta_0 + \beta_1 = \alpha_0$
Population mean wages for men $= \alpha_0 + \alpha_1 = \beta_0$

Therefore $\alpha_0 = 14.64$ and $\alpha_1 = \beta_0 - \alpha_0 = -2.12$

The R^2 and SER will remain the same

Final Result: $14.64 - 2.12 \times Female$ $R^2 = 0.06$ SER $= 4.2$

2 It is given that the samples are independent.

This implies that $B_{m,1}$ and $B_{w,1}$ are also independent.

$var(B_{m,1} - B_{w,1}) = var(B_{m,1}) + var(B_{w,1})$

$var(B_{w,1}) \hat{\approx} SE(B_{w,1})^2$

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~~$var(B_{m,1} - B_{w,1}) = ($~~

$var(B_{m,1} - B_{w,1}) = SE(B_{m,1})^2 + SE(B_{w,1})^2$

$SE(B_{m,1} - B_{w,1}) = \sqrt{SE(\hat{B}_{m,1})^2 + SE(B_{w,1})^2}$

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a) (Shown in the printout)

b) (Shown in the printout)

c) 0.141

d) 0.00991 - 0.0184

e) 0 (Since the p value is 0)
and t-stastic > 1.96

f) 0.1119 (R^2)

g) i) 10th percentile = 14628.
Expected Muncipal Spending = 520.7574 + 14628 x 0.0141782
= 728.15

ii) 90th percentile = 520.7574 + 59559 x 0.0141782
= 1365

h) The outlier is ROWE. One possible explanation could be a large municipality project inflating the per capita spending.