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Assignment 4

1.)

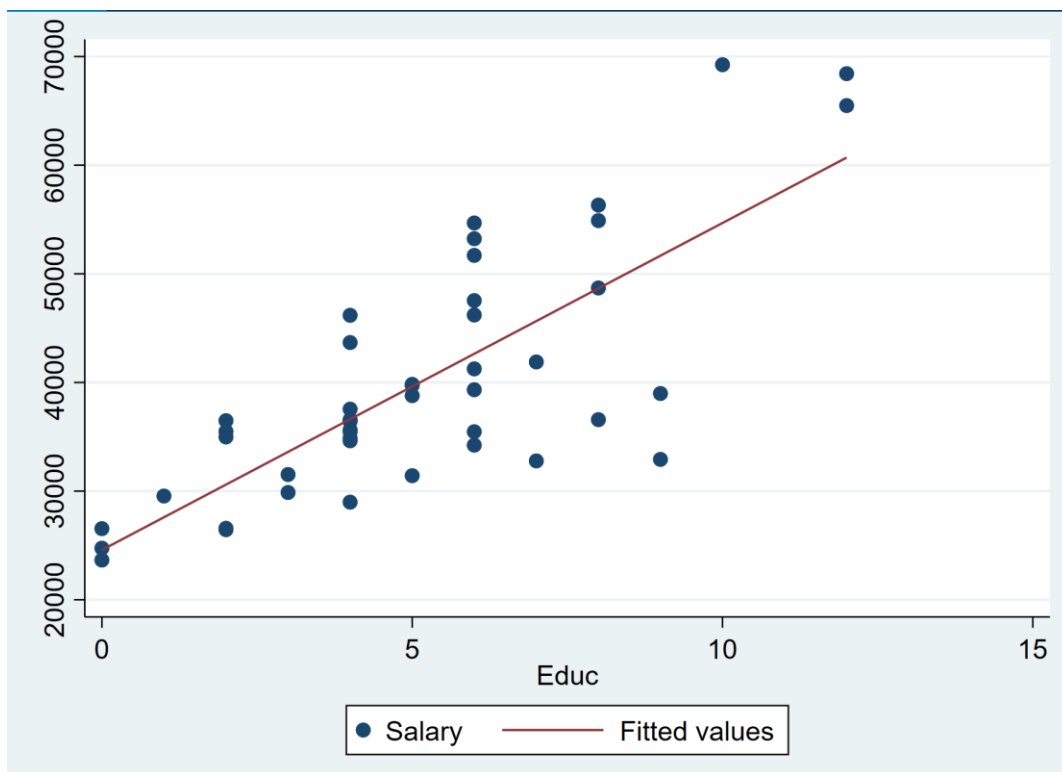
a.)

```
. regress Salary Educ
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Source	SS	df	MS	Number of obs	=	46
Model	3.2868e+09	1	3.2868e+09	F(1, 44)	=	67.03
Residual	2.1575e+09	44	49033504	Prob > F	=	0.0000
Total	5.4443e+09	45	120983365	R-squared	=	0.6037
				Adj R-squared	=	0.5947
				Root MSE	=	7002.4

Salary	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Educ	3009.878	367.6294	8.19	0.000	2268.97	3750.786
_cons	24581.7	2129.189	11.55	0.000	20290.61	28872.8

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b.) $H_0: \beta_{\text{edu}} \leq 0$ $t = \frac{\beta_{\text{edu}} - \beta_0}{S_{\beta_{\text{edu}}}} = 8.19$ $p = 0.000$
 $H_A: \beta_{\text{edu}} > 0$

$t_{\text{critical}} (df = 44, \alpha = 0.01) = \sim 2.42$

Because $8.19 > 2.42$, H_0 is rejected. We have sufficient evidence to say that increases in education lead to an increase in salary.

c.) $\$3009.878$, $s = 367.63$, $t \sim 2.02$

95% confidence: $3009.878 - 2.02(367.63) \leq \beta \leq 3009.878 + 2.02(367.63)$
 $2267.2666 \leq \beta \leq 3752.4894$

We can be 95% confident that each year of post-graduate will increase annual salary by between $\$2267.27$ and $\$3752.49$

d.) $H_0: \beta_{\text{edu}} \leq 2000$ $t = \frac{\beta_{\text{edu}} - \beta_0}{S_{\beta_{\text{edu}}}} = \frac{3009.878 - 2000}{367.63} = 2.747$ $p = 0.003$
 $H_A: \beta_{\text{edu}} > 2000$

$t_{\text{critical}} (df = 44, \alpha = 0.05) = \sim 1.68$

Because $2.747 > 1.68$, H_0 is rejected. We have sufficient evidence to say that increases in education lead to an increase in salary of more than $\$2000$ annually.

e.) On average men earn $\$5415.85$ more than women annually.

$H_0: \mu_{\text{men}} - \mu_{\text{women}} \leq 0$ $t = 1.703$ $p = 0.0478$
 $H_A: \mu_{\text{men}} - \mu_{\text{women}} > 0$

$t_{\text{critical}} (df = 44, \alpha = 0.05) = \sim 1.68$

Because $1.703 > 1.68$, H_0 is rejected. We have sufficient evidence to say that the mean salary for men is significantly higher than the mean salary of women.

```
. ttest Salary, by(Gender)
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Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
0	24	42417.58	2264.409	11093.3	37733.3	47101.87
1	22	37001.73	2220.121	10413.29	32384.73	41618.72
combined	46	39827.39	1621.75	10999.24	36561.02	43093.76
diff		5415.856	3180.117		-993.2482	11824.96

diff = mean(0) - mean(1) t = 1.7030
 $H_0: \text{diff} = 0$ degrees of freedom = 44

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.9522 Pr(|T| > |t|) = 0.0956 Pr(T > t) = 0.0478

f.)

. regress Salary Educ Yrs_Em Gender						
Source	SS	df	MS	Number of obs	=	46
Model	4.0464e+09	3	1.3488e+09	F(3, 42)	=	40.52
Residual	1.3979e+09	42	33282942	Prob > F	=	0.0000
				R-squared	=	0.7432
				Adj R-squared	=	0.7249
Total	5.4443e+09	45	120983365	Root MSE	=	5769.1
Salary	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Educ	1892.748	382.6683	4.95	0.000	1120.492	2665.004
Yrs_Em	659.8216	143.4441	4.60	0.000	370.3397	949.3035
Gender	-1285.941	1747.664	-0.74	0.466	-4812.87	2240.988
_cons	24041.85	2132.068	11.28	0.000	19739.16	28344.54

The coefficient estimate for Gender suggests that women are paid less than men and by \$1285.94 annually.

$$H_0: \beta_{\text{Gender}} \geq 0 \quad t = \frac{\beta_{\text{Gender}} - \beta_0}{S_{\beta_{\text{Gender}}}} = -0.074 \quad p = 0.466$$

$$H_A: \beta_{\text{Gender}} < 0$$

$$t_{\text{critical}} (df = 44, \alpha = 0.05) = \sim 1.68$$

Because $-0.075 < 1.68$, H_0 is NOT rejected. We do not have sufficient evidence to say that the Gender coefficient estimate is significantly less than 0 for $\alpha = 0.05$

g.) The impact of education and experience on salary reduce the estimated impact of gender because there are difference in experience levels and education between men and women. Specifically, the average years of education for men is 5.58 years, but only 4.5 year for women. Additionally, the average number of years of employment for men is 11.83 but only 8.68 for women.

```
. by Gender: summarize Educ
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```
-> Gender = 0
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Variable	Obs	Mean	Std. Dev.	Min	Max
Educ	24	5.583333	2.811725	0	12

```
-> Gender = 1
```

Variable	Obs	Mean	Std. Dev.	Min	Max
Educ	22	4.5	2.824215	0	12

```
. by Gender: summarize Yrs_Em
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```
-> Gender = 0
```

Variable	Obs	Mean	Std. Dev.	Min	Max
Yrs_Em	24	11.83333	8.003622	0	25

```
-> Gender = 1
```

Variable	Obs	Mean	Std. Dev.	Min	Max
Yrs_Em	22	8.681818	6.944586	0	27