

Prelab4

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2020/9/30

```
##This is the Prelab4 of STATS 413
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```

(a.)

```
set.seed(1)
x=rnorm(100)
y=2*x+rnorm(100)
summary(lm(y~x + 0))
```

```
##
## Call:
## lm(formula = y ~ x + 0)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.9154 -0.6472 -0.1771  0.5056  2.3109
##
## Coefficients:
##      Estimate Std. Error t value Pr(>|t|)
## x      1.9939      0.1065   18.73  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9586 on 99 degrees of freedom
## Multiple R-squared:  0.7798, Adjusted R-squared:  0.7776
## F-statistic: 350.7 on 1 and 99 DF,  p-value: < 2.2e-16
```

$\hat{\beta}_x = 1.9939$, $Std.err = 0.1065$, $t - statistic = 18.73$, $P - value = 2e - 16$ The residual standard error is almost not related to the coefficient estimate. The p-value is statistically significant.

(b.)

```
summary(lm(x ~ y + 0))
```

```
##
## Call:
## lm(formula = x ~ y + 0)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.8699 -0.2368  0.1030  0.2858  0.8938
##
## Coefficients:
```

```
##      Estimate Std. Error t value Pr(>|t|)
## y   0.39111      0.02089   18.73  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4246 on 99 degrees of freedom
## Multiple R-squared:  0.7798, Adjusted R-squared:  0.7776
## F-statistic: 350.7 on 1 and 99 DF,  p-value: < 2.2e-16
```

$\hat{\beta}_x = 0.39111$, $Std.err = 0.02089$, $t - statistic = 18.73$, $P - value = 2e - 16$ The residual standard error is almost not related to the coefficient estimate. The p-value is statistically significant.

(c.) The t-value and p-statistic are the same, only the estimate of coefficients are different, which reflects the relationship $y = 2x + \varepsilon$