Mid

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#Data

```
low.btw <- load("low_bwt.Rdata")
attach(low.bwt)
```

Model completed

#a)

```
model1 <- lm(birthwt~toxemia,)
summary(model1)
```

```
##
## Call:
## lm(formula = birthwt ~ toxemia)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -537.22 -219.16   53.89  225.28  392.78
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 1097.215     30.529  35.940   <2e-16 ***
## toxemiaYes     7.785     66.620   0.117    0.907
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 271.3 on 98 degrees of freedom
## Multiple R-squared:  0.0001393,  Adjusted R-squared:  -0.01006
## F-statistic: 0.01365 on 1 and 98 DF,  p-value: 0.9072
```

i) Equation birth weight = 1097.215 +7.785*Toxemia Yes

ii) Confidence interval

```
confint(model1,level=0.95)
```

```
##                 2.5 %    97.5 %
## (Intercept) 1036.6312 1157.7992
## toxemiaYes  -124.4203  139.9899
```

Interpretation

Since the confidence interval at 95% goes from a negative value (-124.42) and a positive one (139.9899) we can not be confident about the effect of the toxemia in the birth weight.

b)

```
model2 <- lm(birthwt~toxemia+gestage,)
summary(model2)
```

```
##
## Call:
## lm(formula = birthwt ~ toxemia + gestage)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -615.54 -133.84   16.49  157.67  372.58
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -1286.200    234.918  -5.475 3.43e-07 ***
## toxemiaYes   -206.591     51.078  -4.045 0.000105 ***
## gestage        84.058      8.251  10.188  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 189.6 on 97 degrees of freedom
## Multiple R-squared:  0.517,  Adjusted R-squared:  0.507
## F-statistic: 51.91 on 2 and 97 DF,  p-value: 4.703e-16
```

i)

B0=-1286.2 is the value base when Toxemia is No ans it is meaningful because it our base point when we keep constant the gestational age. B1=-206.591 when Toxemia is Yes, decrease the birth weight 206.591 grams when we keep gestational age constant. B2=84.058 when the gestational age increase one week and the Toxemia is NO, the birth weight increase 84.058 grams.

ii)

Equation

birth weight = -1286.2 -206.591*(Toxemia Yes)+84.058*gestational age

```
New_data=data.frame(toxemia=c("Yes"), gestage=c(31))
predict(model2, newdata = New_data, interval="prediction", level=0.95)
```

```
##        fit      lwr      upr
## 1 1113.006 727.9062 1498.105
```

The average birth weight for an infant born to a mother diagnosed with toxemia with 31 weeks is predicted to have a weight of 1113 grams.

ii)

```
predict(model2, newdata = New_data, interval="confidence", level=0.95)
```

```
##        fit      lwr      upr
## 1 1113.006 1030.888 1195.123
```

```
predict(model2, newdata = New_data, interval="prediction", level=0.95)
```

```
##        fit      lwr      upr
## 1 1113.006 727.9062 1498.105
```

We estimate with a confidence of 95% that the mean value of E(y) is between 1030 an 1195. We predict y_hat is between 727.9 an 1498.