HW3

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2023-02-25

Question 1

Fit a regression model with the brozek variable (percent of body fat) as a response and the following five predictors: age, neck, abdom, forearm and wrist.

```
library(faraway)
model <- lm(brozek ~  age + neck + abdom + forearm + wrist, fat)
summary(model)
```

```
##
## Call:
## lm(formula = brozek ~ age + neck + abdom + forearm + wrist, data = fat)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -11.6196  -2.8049  -0.1558   2.6924  10.1805
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) -6.78745    5.38359  -1.261 0.208588
## age          0.08671    0.02214   3.916 0.000117 ***
## neck        -0.55595    0.19919  -2.791 0.005666 **
## abdom        0.72146    0.03745  19.263  < 2e-16 ***
## forearm      0.47392    0.17345   2.732 0.006745 **
## wrist       -2.05184    0.43832  -4.681 4.72e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 4.062 on 246 degrees of freedom
## Multiple R-squared:  0.7308, Adjusted R-squared:  0.7253
## F-statistic: 133.5 on 5 and 246 DF,  p-value: < 2.2e-16
# all the five variables are significant at  0.05 level
```

Question 2 Provide interpretation to the coefficient of each significant predictor

```
#A one yrs increases in age is associated with average increases of 0.087 Percent of body fat using Bro:
#A one cm increases in Neck circumference is associated with average decrease of 0.556 Percent of body :
#A one cm increases in Abdomen circumference is associated with average increase of 0.721 Percent of bo
#A one cm increases in Forearm circumference is associated with average increaase of 0.474 Percent of b
#A one cm increases in Wrist circumference is associated with average decrease of 2.05 Percent of body :
```

Question 3 Compute the median values of the five predictors. Store the medians in a variable named x0 and show the values.

```
x <- model.matrix(model)
(x0 <- apply(x,2,median))
```

```
## (Intercept)         age        neck       abdom     forearm       wrist
##        1.00       43.00       38.00       90.95       28.70       18.30
```

Question 4 Construct a confidence interval of the mean response based on the median values that you stored in x0.

```
predict(model, new = data.frame(t(x0)),interval = "confidence")
```

```
##      fit      lwr      upr
## 1 17.485 16.95855 18.01145
```

Question 5 Construct a prediction interval of future response value based on the median values that you stored in x0.

```
predict(model, new = data.frame(t(x0)),interval = "prediction")
```

```
##      fit      lwr      upr
## 1 17.485 9.466319 25.50368
```

Question 6: Which of the two intervals is wider? The prediction interval is wider

Question 7: Construct a confidence interval of the outcome variable for a person with the following characteristics: Age: 50 years Neck circumference: 42 cm Abdomen circumference: 95 cm Forearm circumference: 30cm Wrist circumference: 17 cm

```
x1 <- c("(Intercept)" = 1, age = 50, neck = 42, abdom = 95, forearm = 30, wrist = 17)
predict(model, new = data.frame(t(x1)),interval = "confidence")
```

```
##        fit      lwr      upr
## 1 22.07361 19.73005 24.41717
```