MATH 324 Homework 8

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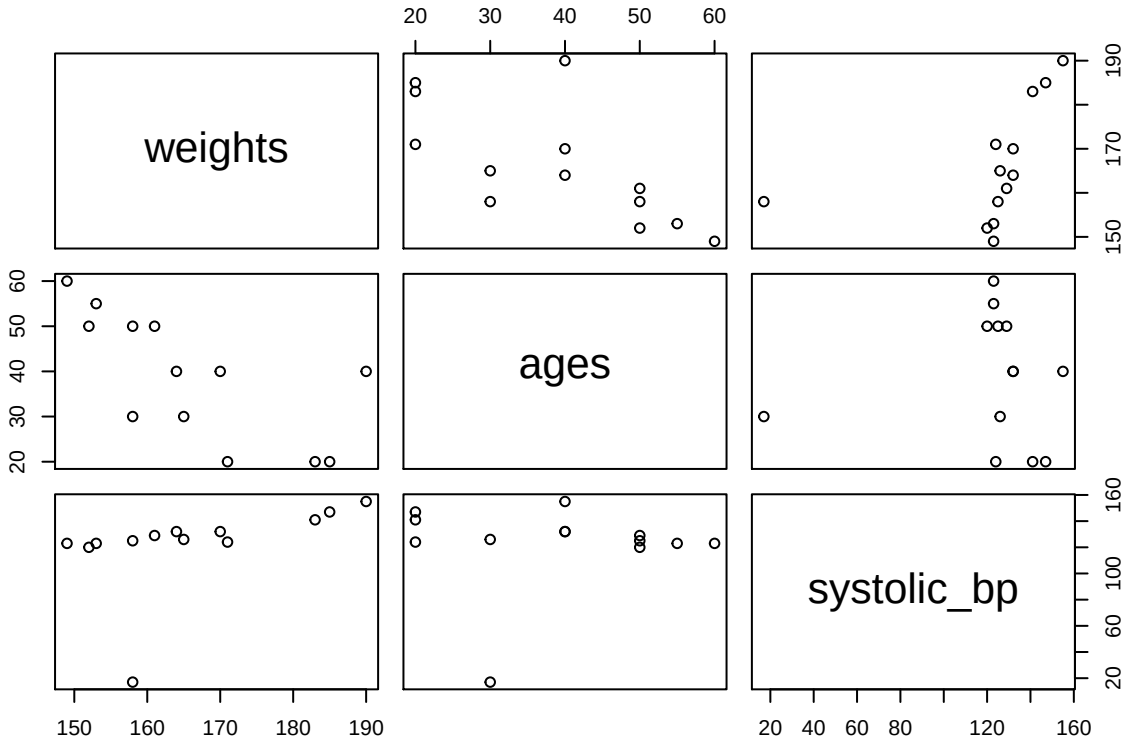
Problem 1

```
weights = c(152, 183, 171, 165, 158, 161, 149, 158, 170, 153, 164, 190, 185)

ages = c(50,20,20,30,30,50,60,50,40,55,40,40,20)

systolic_bp = c(120, 141, 124, 126, 17, 129, 123, 125, 132, 123, 132, 155, 147)


pressure = data.frame(weights, ages, systolic_bp)

round(cor(pressure), 3)
```

```
##             weights   ages systolic_bp
## weights       1.000 -0.700       0.454
## ages         -0.700  1.000       0.039
## systolic_bp   0.454  0.039       1.000
```

Problem 2

```
pairs(pressure)
```



Problem 3

```
lm2 = lm(systolic_bp~., data = pressure)

summary(lm2)
```

```
##
## Call:
## lm(formula = systolic_bp ~ ., data = pressure)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -71.375  -0.246   5.644  12.304  21.340
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -340.4837   160.7914  -2.118   0.0603 .
## weights        2.3945     0.8292   2.888   0.0162 *
## ages           1.6844     0.7871   2.140   0.0580 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 26.99 on 10 degrees of freedom
## Multiple R-squared:  0.4555, Adjusted R-squared:  0.3466
```

```
## F-statistic: 4.183 on 2 and 10 DF,  p-value: 0.04786
```

Problem 4

```
confint.lm(lm2, level = 0.95, interval = "c")
```

```
##                      2.5 %    97.5 %
## (Intercept) -698.74936220 17.781980
## weights        0.54683202  4.242129
## ages          -0.06931235  3.438042
```

```
t_val = qt(1.95/2, df = 10)

interval_1 = t_val*(0.8292)
interval_2 = t_val*(0.7871)

c(2.395-interval_1, 2.395+interval_1)
```

```
## [1] 0.5474273 4.2425727
```

```
c(1.684-interval_2, 1.684+interval_2)
```

```
## [1] -0.06976809  3.43776809
```

Problem 5

```
summary(lm2)
```

```
##
## Call:
## lm(formula = systolic_bp ~ ., data = pressure)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -71.375  -0.246   5.644  12.304  21.340
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -340.4837   160.7914  -2.118   0.0603 .
## weights        2.3945     0.8292   2.888   0.0162 *
## ages           1.6844     0.7871   2.140   0.0580 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 26.99 on 10 degrees of freedom
## Multiple R-squared:  0.4555, Adjusted R-squared:  0.3466
## F-statistic: 4.183 on 2 and 10 DF,  p-value: 0.04786
```

```
#In this problem, the R-Squared value is 0.4555

#The Adjusted R-squared value is 0.3466
```

Problem 6

```
attach(pressure)
sum((systolic_bp - mean(systolic_bp))^2)
```

```
## [1] 13379.08
```

```r
deviance(lm2)
```

```
## [1] 7284.926
```

```r
syst_syy = predict(lm2)
sum((syst_syy - mean(systolic_bp))^2)
```

```
## [1] 6094.15
```

Problem 7

```r
est_sig_sq = deviance(lm2)/11
```

Problem 8

```r
predict(lm2, data.frame(weights = 175, ages = 60), level = 0.99, interval = "c", se = T)
```

```
## $fit
##        fit      lwr      upr
## 1 179.6123 104.5782 254.6464
##
## $se.fit
## [1] 23.67549
##
## $df
## [1] 10
##
## $residual.scale
## [1] 26.9906
```

Problem 9

```r
predict(lm2, data.frame(weights = 165, ages = 45), level = 0.90, interval = "c", se = T)
```

```
## $fit
##       fit      lwr      upr
## 1 130.402 114.7858 146.0183
##
## $se.fit
## [1] 8.616057
##
## $df
## [1] 10
##
## $residual.scale
## [1] 26.9906
```