MidTerm

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```
y = c(152, 185, 180, 196, 142, 101, 149, 115, 175, 164, 141, 141, 184, 152, 148)
x1 = c(73, 93, 89, 96, 73, 53, 69, 47, 87, 79, 69, 70, 93, 79, 1)
x2 = c(80, 88, 91, 98, 66, 46, 74, 56, 79, 70, 70, 65, 95, 80, 73)
x3 = c(75, 93, 90, 100, 70, 55, 77, 0, 90, 88, 73, 74, 91, 73, 78)

###### Question 1 ######
dataFrame = data.frame(y, x1, x2, x3)
linearModel = lm(y ~ x1 + x2 + x3, data = dataFrame)
summary(linearModel)
```

```
##
## Call:
## lm(formula = y ~ x1 + x2 + x3, data = dataFrame)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -9.4698 -5.1349  0.4287  4.6545 12.2510
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  27.1858    11.2330   2.420   0.0340 *
## x1            0.1066     0.1059   1.007   0.3356
## x2            1.3459     0.2242   6.003 8.89e-05 ***
## x3            0.2492     0.1261   1.976   0.0738 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 7.72 on 11 degrees of freedom
## Multiple R-squared:  0.9325, Adjusted R-squared:  0.914
## F-statistic: 50.62 on 3 and 11 DF,  p-value: 1.001e-06
```

```
# Y = 0.11x1 + 1.35x2 + 0.25x3 + 27.19

###### Question 2 ######
summary(linearModel)$r.squared
```

```
## [1] 0.9324626
```

```
###### Question 3 ######
summary(linearModel)$adj.r.squared
```

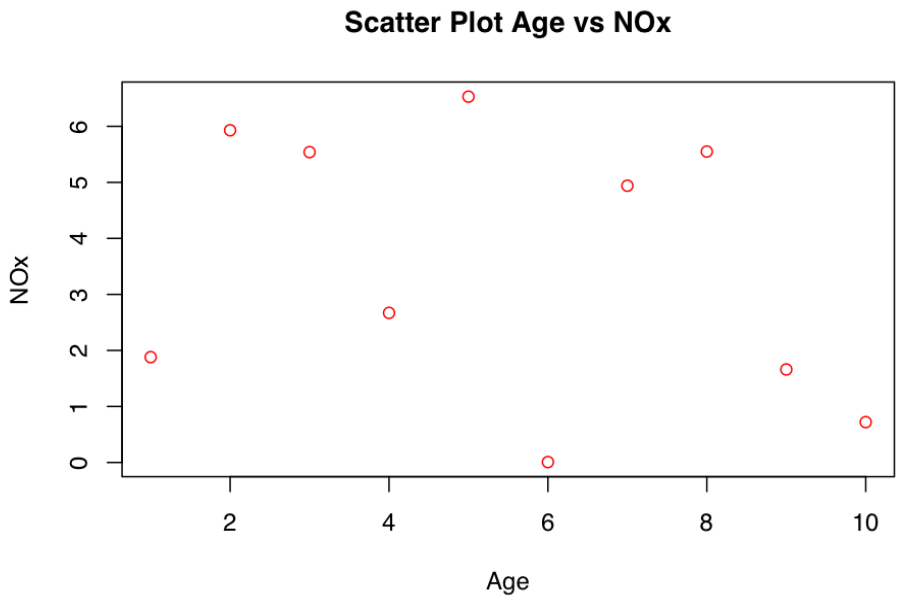
```
## [1] 0.9140433
```

```
###### Question 4 ######
linearModelResidual = resid(linearModel)
print(linearModelResidual)
```

```
##          1          2          3          4          5          6
## -9.3283649  6.2866837 -1.5768262  1.7637924  0.7597229 -7.4525054
##          7          8          9         10         11         12
```

```
## -4.3250372  7.4341538  9.7868264 12.2510340 -5.9448045  0.4287069
##          13         14         15
## -3.6359968 -9.4697514  3.0223662
```

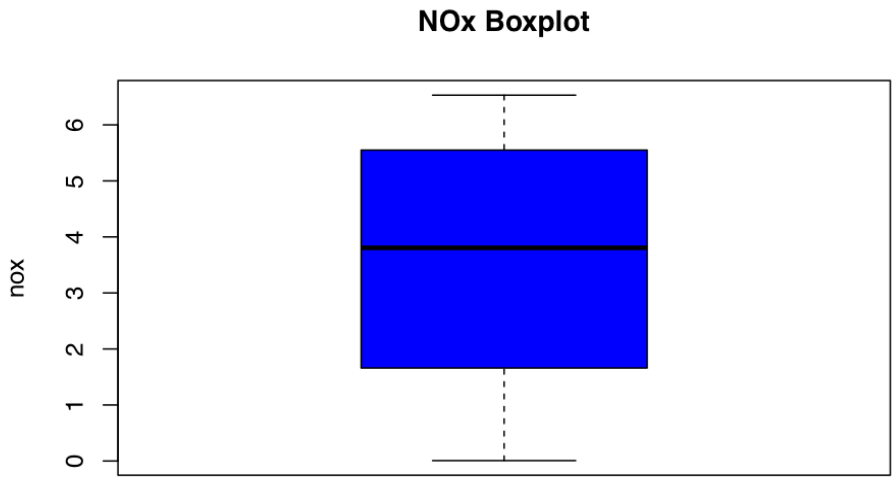
```
###### Question 5 ######
age1 = c(1, 2, 3, 4, 5, 6, 7, 8, 9, 10)
nox = c(1.88, 5.93, 5.54, 2.67, 6.53, 0.007, 4.94, 5.55, 1.66, 0.72)

###### Question 6 ######
plot(age1, nox, main = "Scatter Plot Age vs NOx", xlab = "Age",
     ylab = "NOx", col = "red")
```



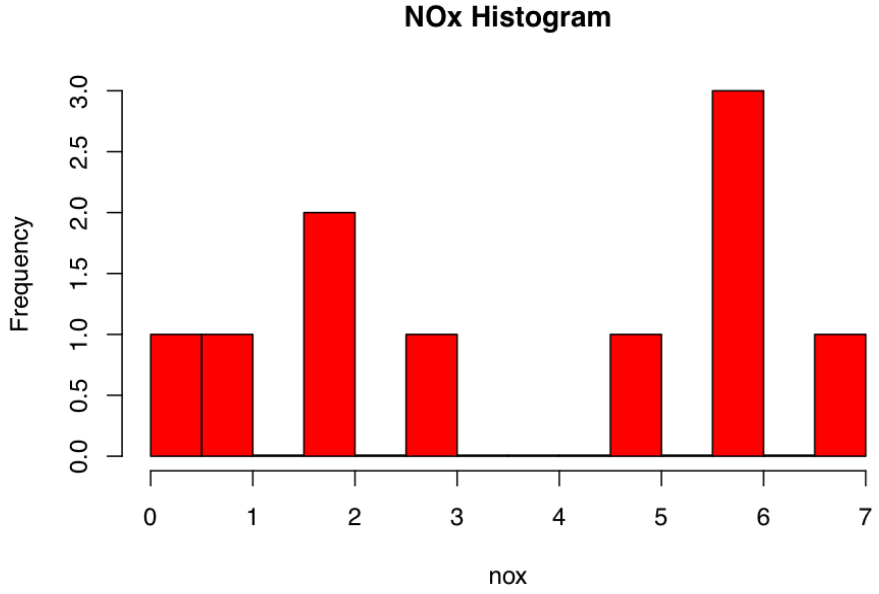

```
###### Question 7 ######
cor(age1, nox)
```

```
## [1] -0.3049075
```

```
###### Question 8 ######
boxplot(nox, main = "NOx Boxplot", ylab = "nox", col = "blue")
```




```
hist(nox, main = "NOx Histogram", breaks = 10, col = "red")
```




```
###### Question 9 ######
mean(nox)
```

```
## [1] 3.5427
```

```
median(nox)
```

```
## [1] 3.805
```

```r
var(nox)
```

```
## [1] 5.792624
```

```r
sd(nox)
```

```
## [1] 2.406787
```