Assignment 4 Example

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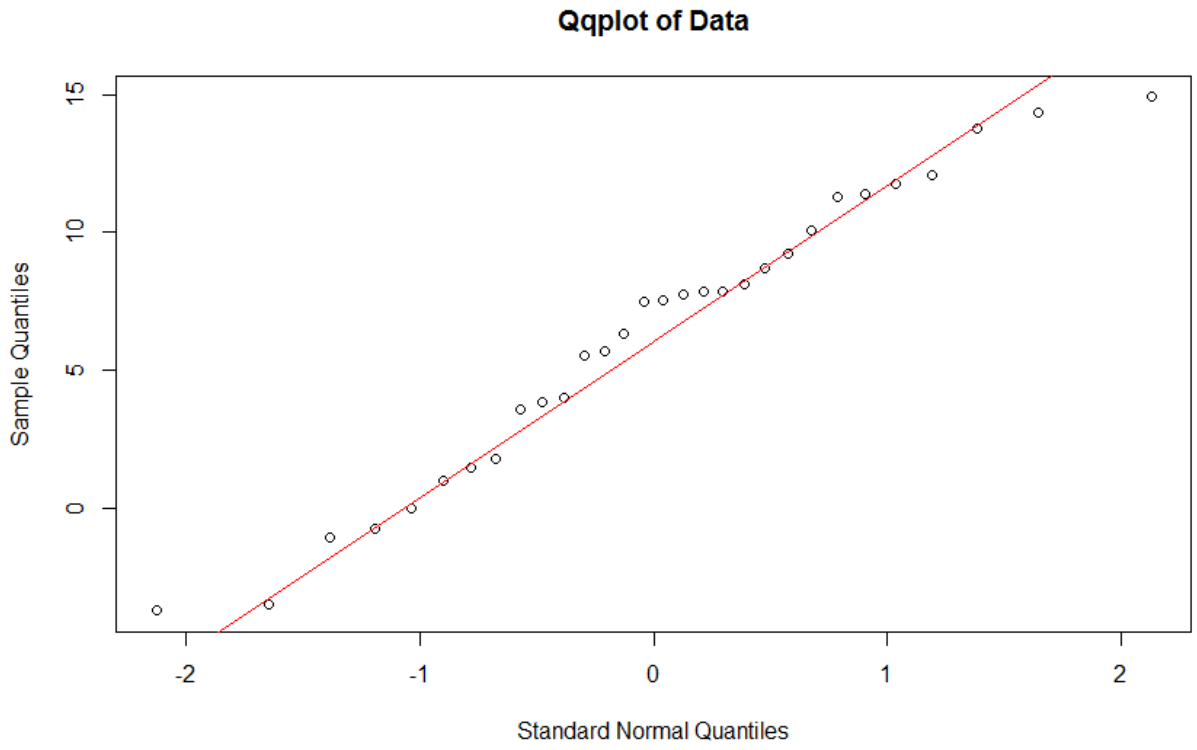
<u>Problem 1:</u> Fill in the information below based on your data which were generated using your ID number as the seed for the random number generator.

model = 1 **mu = 8** **sigma = 5**



Based on the qqplot indicate how well the Gaussian model fits the data. Justify your conclusion.

mu0 = 9

```
> t.test(y,mu=mu0,conf.level=0.95)

        One Sample t-test

data:  y
t = -2.8669, df = 29, p-value = 0.007643
alternative hypothesis: true mean is not equal to 9
95 percent confidence interval:
 4.336738 8.219928
sample estimates:
mean of x
 6.278333
```

value of test statistic for testing H: mu = mu0 is: -2.8669

degrees of freedom of t distribution = 29

p-value for testing H: mu=mu0 equals 0.007643

95% confidence interval for mu is: [4.336738, 8.219928]

Insert your conclusion regarding H: mu=mu0 here.

sample mean = 6.278333

sigma0 = 7

sample variance = 27.03675

p-value for testing H: sigma = sigma0 equals 0.04895834

Insert your conclusion regarding H: sigma=sigma0 here.

95% confidence interval for sigma squared: [17.14843, 48.86035]

95% confidence interval for sigma: [4.141067, 6.990018]

<u>Problem 2:</u> Fill in the information below based on your data which were generated using your ID number as the seed for the random number generator.

alpha = 2.293382 beta = -2.601833 model = 1

sample correlation = -0.8625526

```
Call:
lm(formula = y ~ x)

Residuals:
     Min       1Q   Median       3Q      Max
-21.2398  -5.9288  -0.4623   7.0616  20.0681

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)    5.435      2.021    2.69   0.0084 **
x             -2.954      0.175  -16.88   <2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 9.326 on 98 degrees of freedom
Multiple R-squared: 0.744,     Adjusted R-squared: 0.7414
F-statistic: 284.8 on 1 and 98 DF,  p-value: < 2.2e-16
```

estimate of the intercept = 5.435

estimate of the slope = -2.954

degrees of freedom of t distribution = 98

value of test statistic for testing H: no relationship (slope = 0) equals -16.88

p-value for testing the H: no relationship (slope = 0) equals 2.2e-16

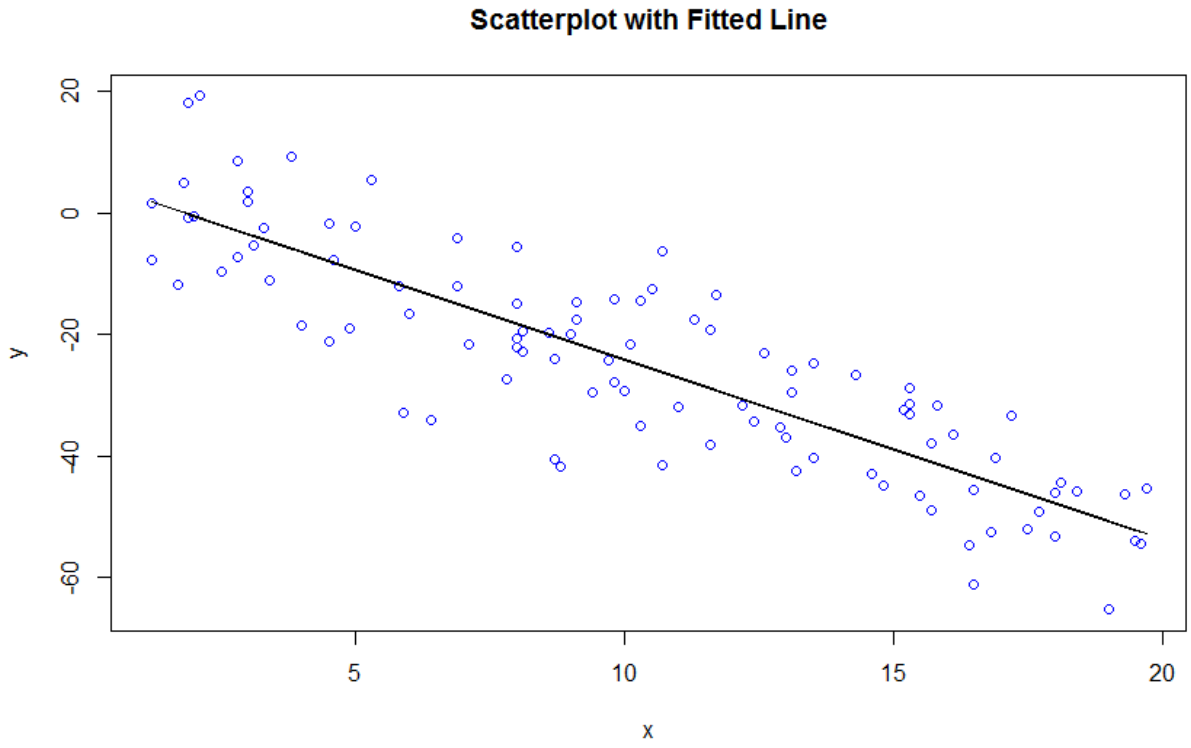
Insert your conclusion regarding the hypothesis of no relationship here.

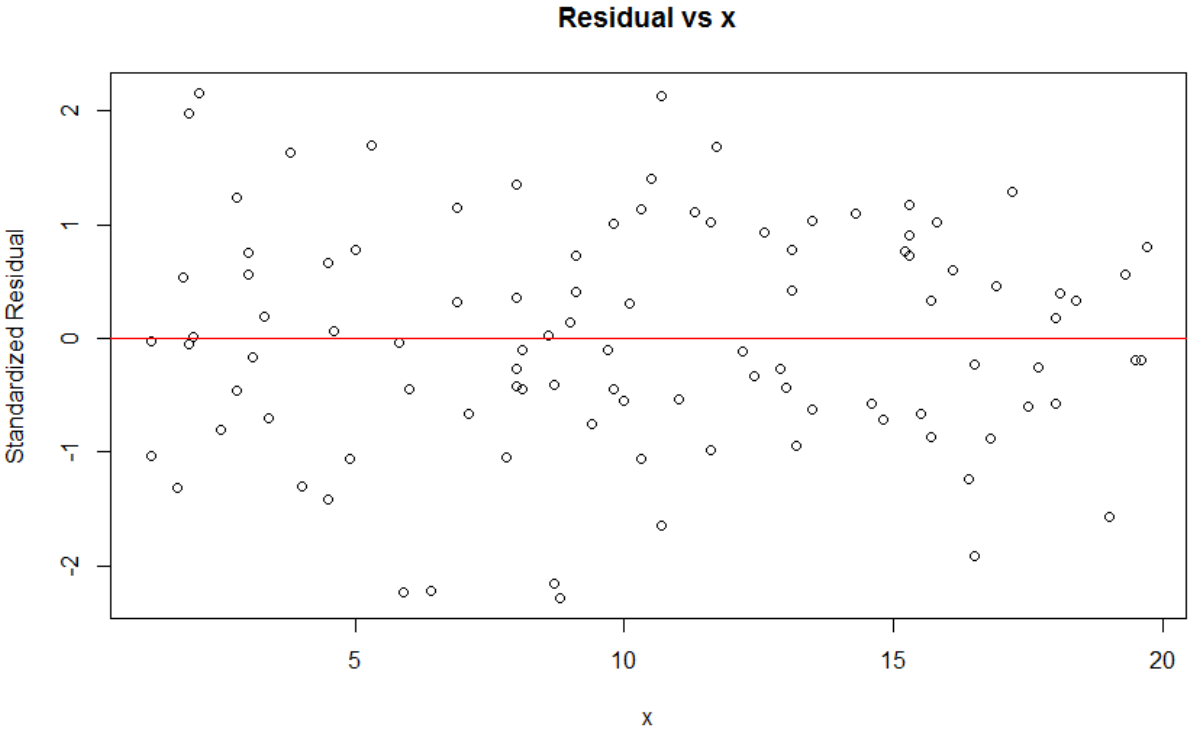
estimate of sigma = 9.326383

95% confidence interval for the slope: [-3.301399, -2.606673]

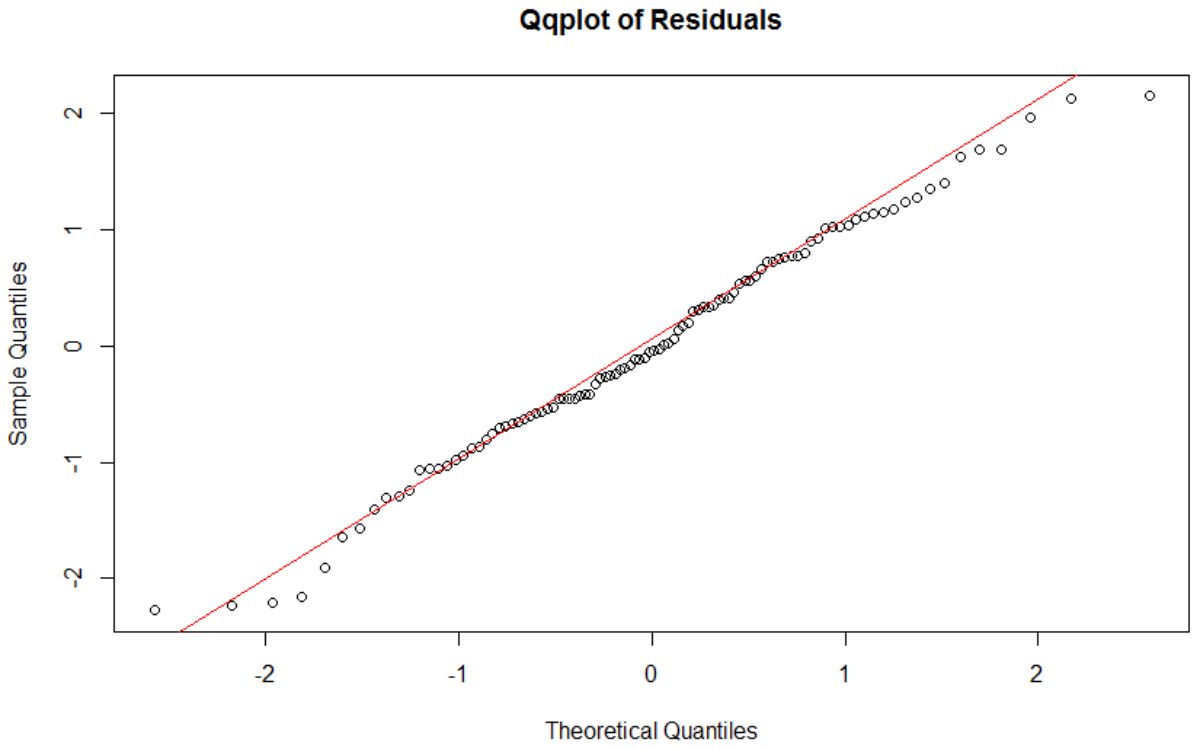
90% confidence interval for the mean response at x=5: [-11.507 -7.162702]

99% prediction interval for the response at x=2: [-25.38452, 24.43904]


Scatterplot with Fitted Line
y
x
20
0
-20
-40
-60
5
10
15
20


Residual vs x
Standardized Residual
x
2
1
0
-1
-2
5
10
15
20


Residual vs Muhat
Standardized Residual
Muhat
2
1
0
-1
-2
-50
-40
-30
-20
-10
0


Qqplot of Residuals
Sample Quantiles
Theoretical Quantiles
2
1
0
-1
-2

Based on the scatterplot with fitted line and the residual plots discuss the fit of the simple linear model to your data. Be sure to comment on each plot. Indicate clearly what you expect to see for each plot if the model assumptions hold and what you observe for your data.

<u>Problem 3:</u> Fill in the information below based on your data which were generated using your ID number as the seed for the random number generator.

mu1 = -3.171255 mu2 = -0.371706 sigma = 5

```
> t.test(y1,y2,mu=0,var.equal=TRUE,conf.level=0.95)
        Two Sample t-test
data:  y1 and y2
t = -2.7641, df = 63, p-value = 0.007477
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -4.6087821 -0.7410274
sample estimates:
 mean of x  mean of y
-2.8103333 -0.1354286
```

The value of the test statistic for testing H: mu 1= mu2 equals -2.7641

degrees of freedom of t distribution = 63

p-value for testing H: mu1=mu2 equals 0.007477

Insert your conclusion regarding H: mu1=mu2 here.

95% confidence interval for the difference in means: [-4.6087821, -0.7410274]

sample means:

y1bar = -2.8103333

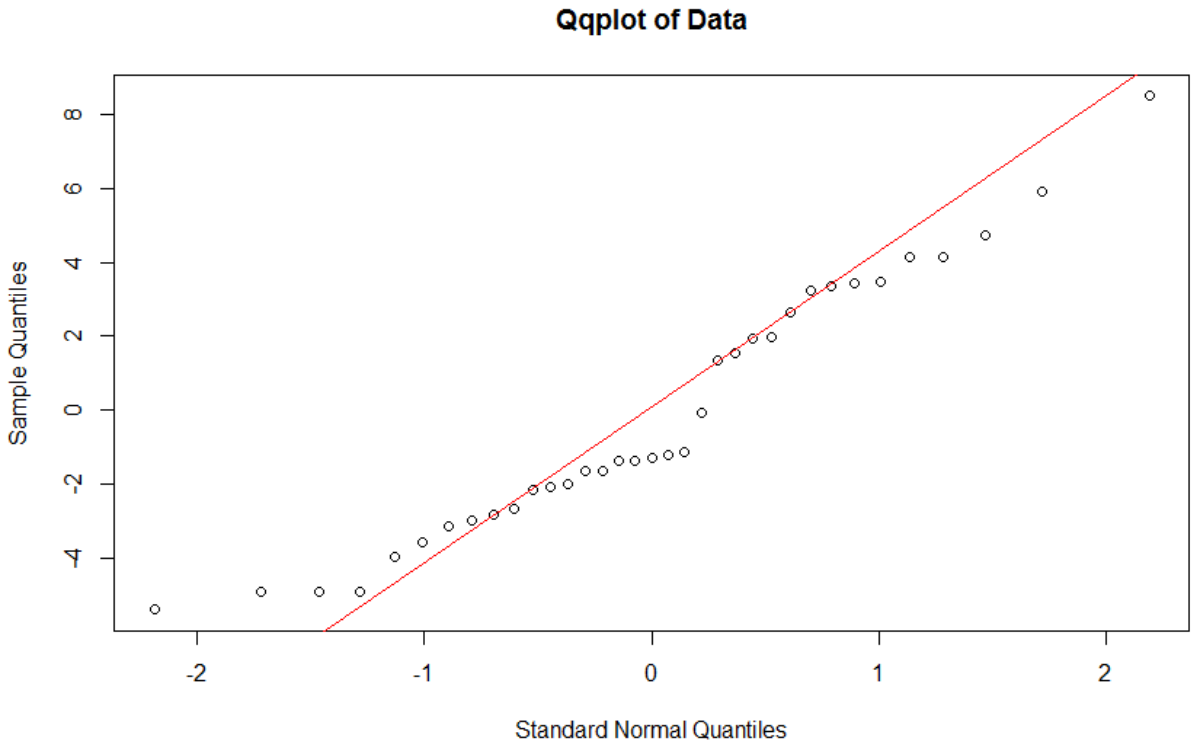
y2bar = -0.1354286

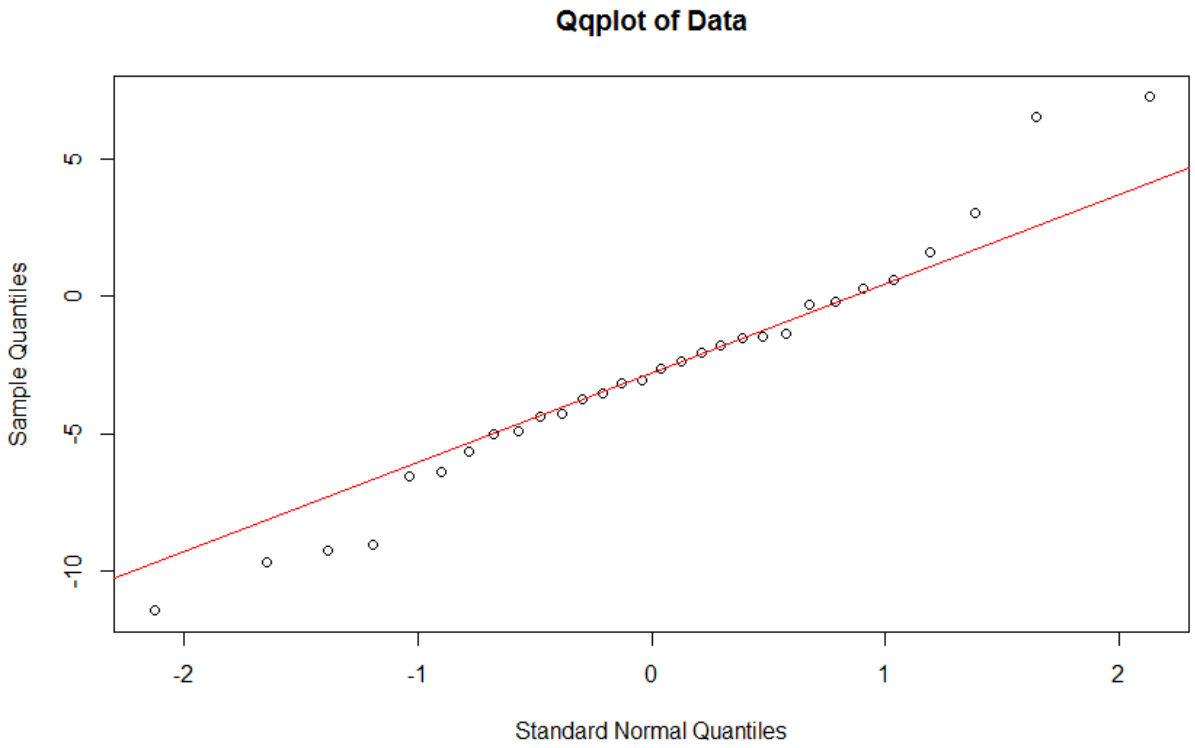
sample standard deviations:

s1 = 4.298046

s2 = 3.503656

pooled estimate of sigma = 3.889532


Qqplot of Data
Sample Quantiles
8
6
4
2
0
-2
-4
-2
-1
0
1
2
Standard Normal Quantiles


Qqplot of Data
Sample Quantiles
5
0
-5
-10
-2
-1
0
1
2
Standard Normal Quantiles

Based on the qqplots indicate how well the Gaussian model fits each data set. Justify your conclusions.