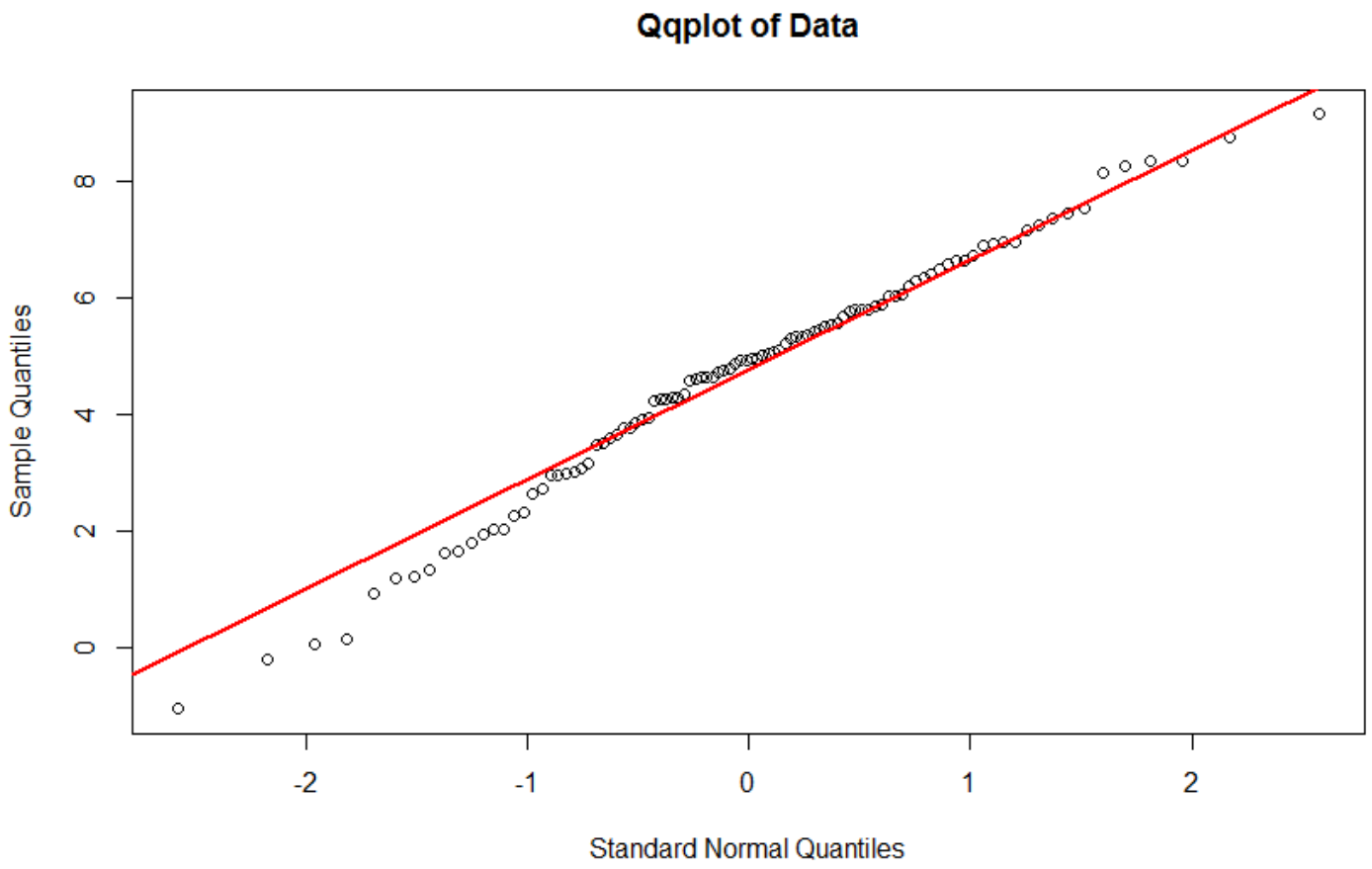
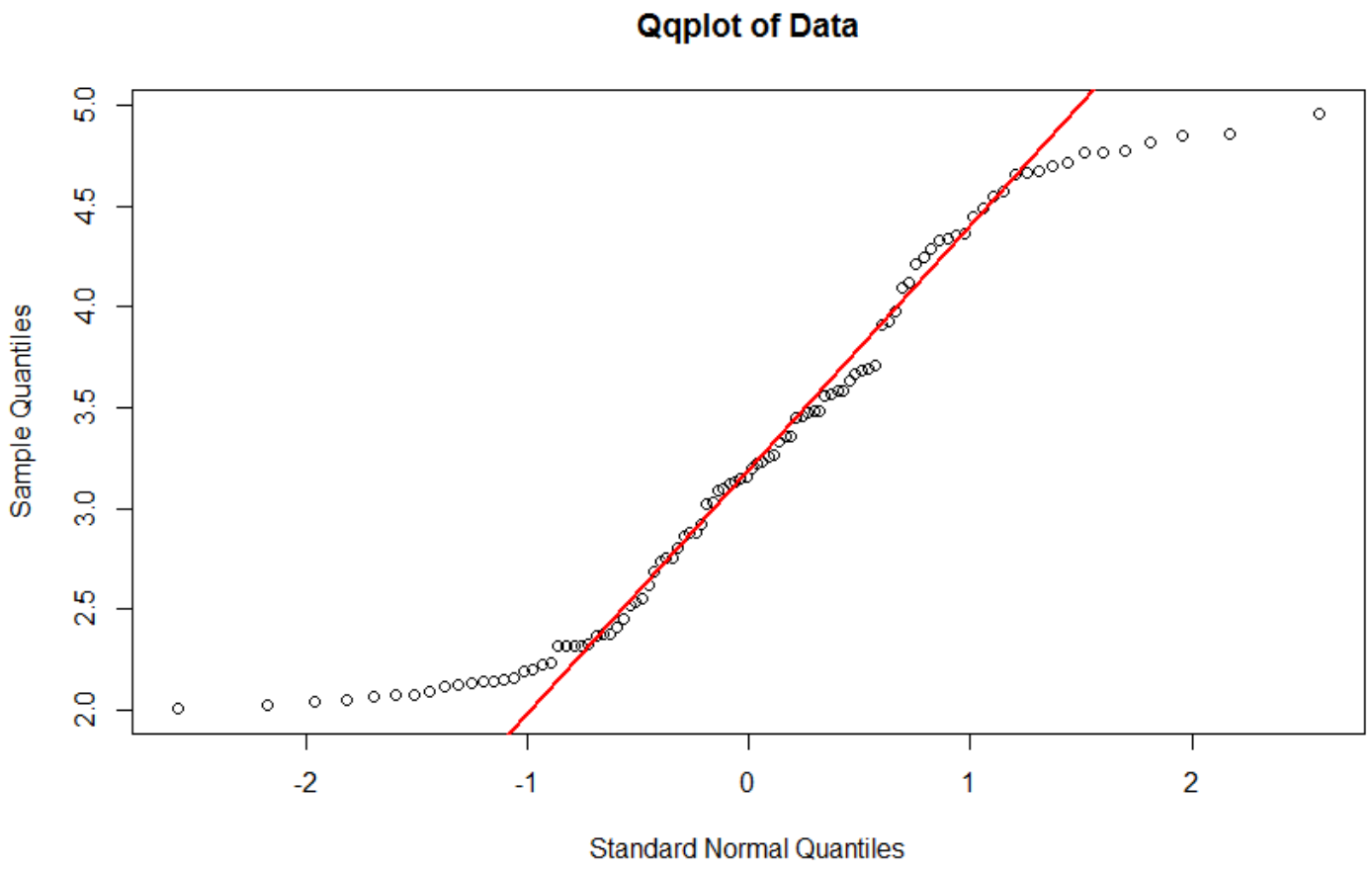
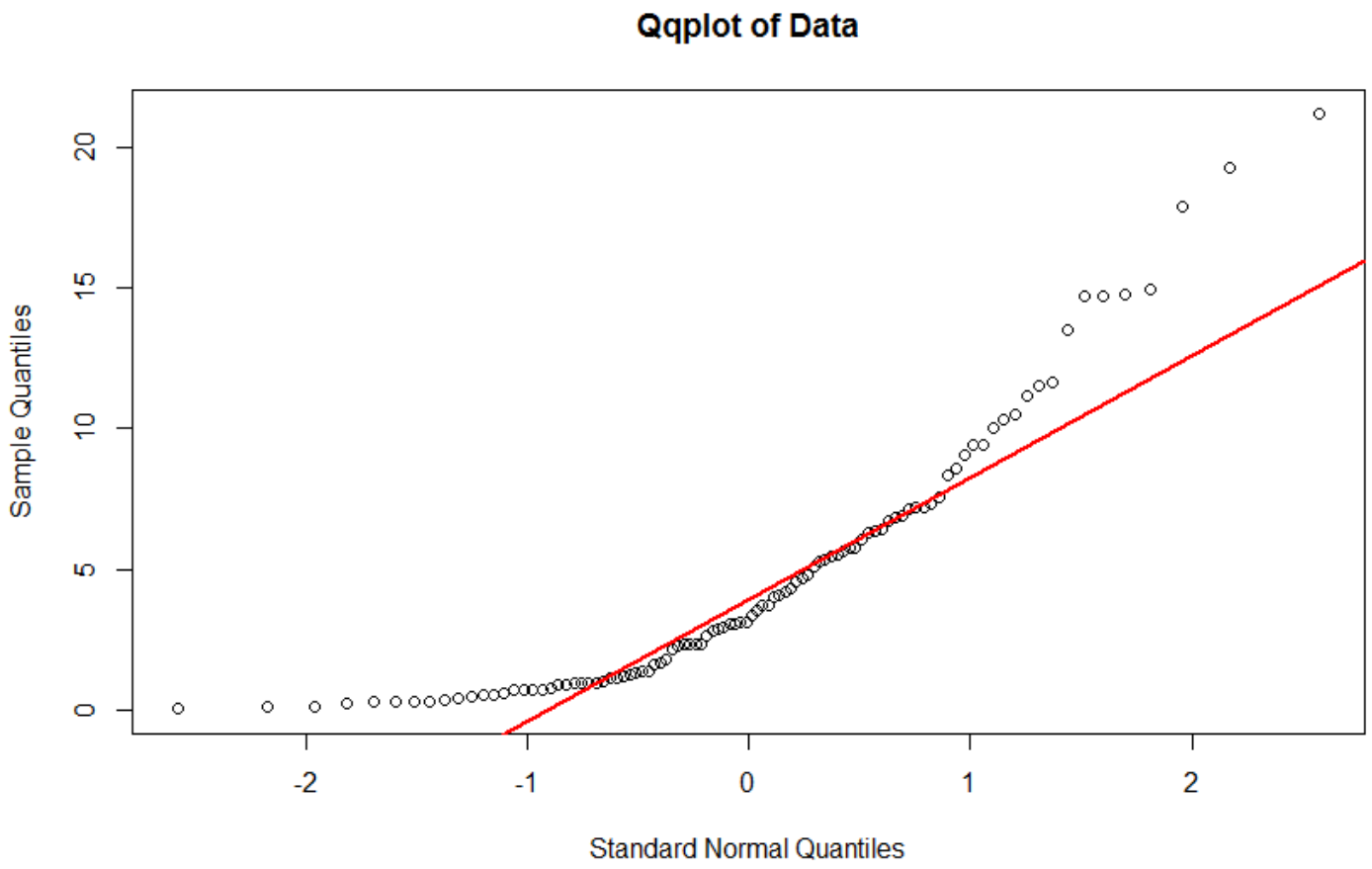
Problem 1

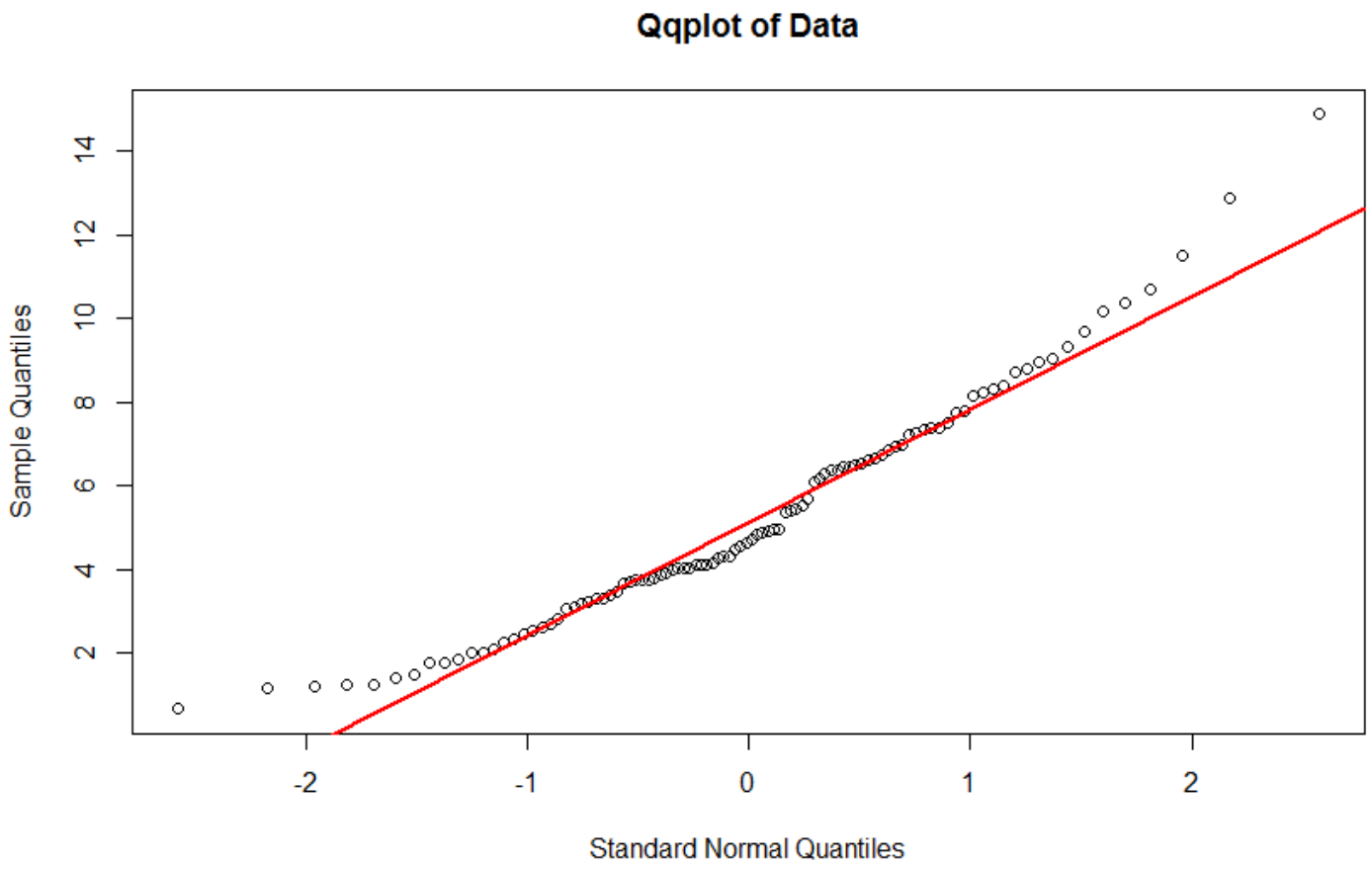
Based on the following qqplots, how well do you think a Gaussian model fit the data?

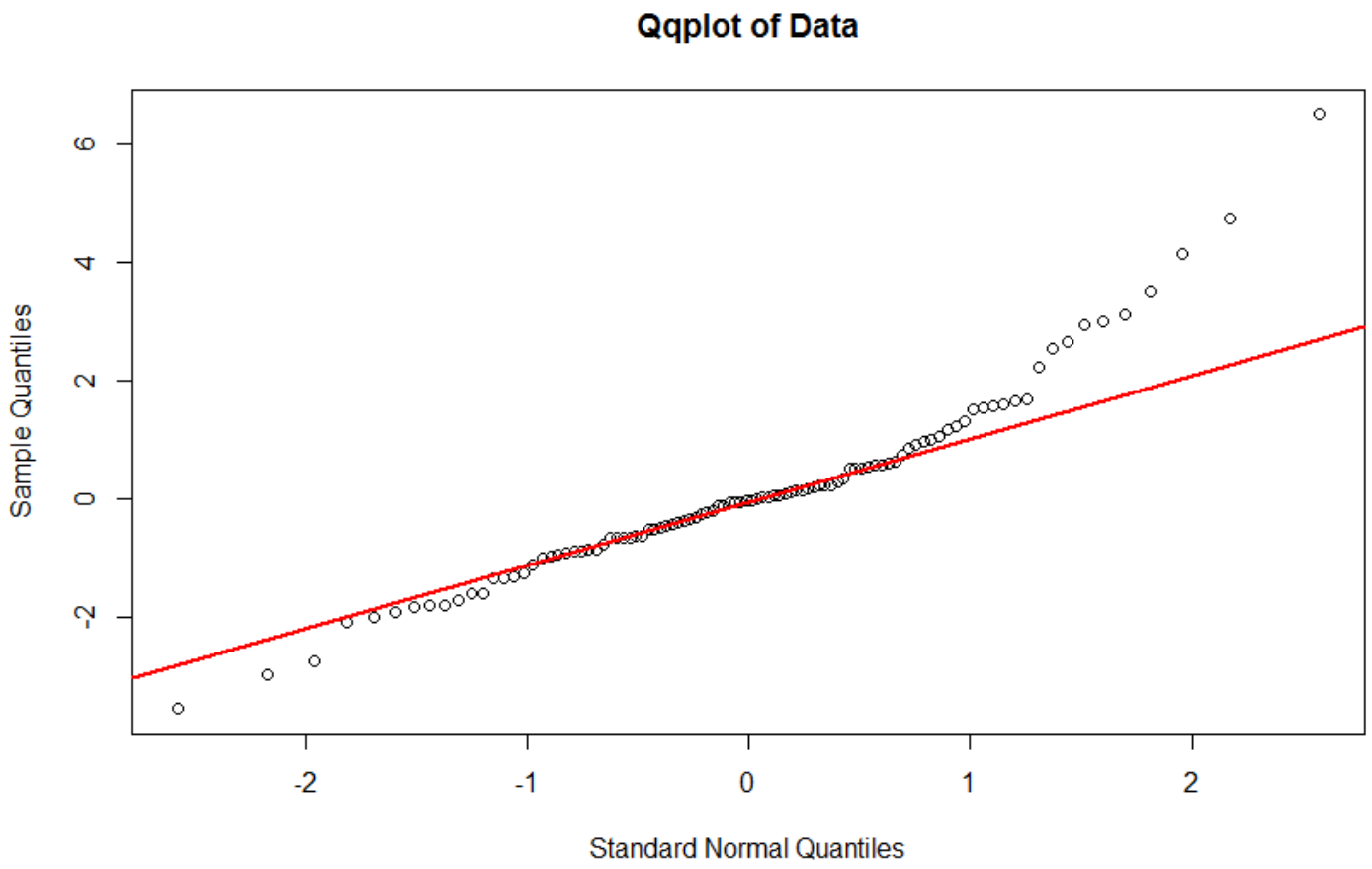
If you think a Gaussian model does not fit the data indicate another model that you think might fit better.


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


Qqplot of Data
Sample Quantiles
Standard Normal Quantiles
2.0
2.5
3.0
3.5
4.0
4.5
5.0
-2
-1
0
1
2


Qqplot of Data
Sample Quantiles
0
5
10
15
20
-2
-1
0
1
2
Standard Normal Quantiles


Qqplot of Data
Sample Quantiles
2
4
6
8
10
12
14
-2
-1
0
1
2
Standard Normal Quantiles


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

Problem 2

Suppose $y_1, y_2, \ldots, y_n$ is an observed random sample from the distribution with probability density function

$$f(y;\theta) = \frac{\theta}{y^{\theta+1}} \quad y \geq 1, \ \theta > 0$$

(a) Find the maximum likelihood estimate of *θ*.

(b) Find the relative likelihood function of *θ*.

(c) Find the maximum likelihood estimate of $P(Y > 2; \theta)$ if Y has the probability density function above.

Problem 3

A proposed model for the number of children Y in a randomly chosen family is given by:

$$P(Y = y;\theta) = y(1-\theta)^2\theta^{y-1}, \quad y = 1,2,\ldots, \quad 0 < \theta \leq \frac{1}{2}$$

Data from 200 randomly chosen children gave the following data (frequency table):

y	1	2	3	4	> 4	Total
f_y	22	7	3	1	0	33

Problem 3 Continued

(a) Determine the maximum likelihood estimate of θ.

(b) Determine the relative likelihood function of θ.

(c) Determine the maximum likelihood estimate of $P(Y \leq 2; \theta)$ if Y has the probability function above.