Reinterventions exploration

Controling Variables

```
cat(controlling_vars %>% as.yaml())
```

```
- Age
- Gender
- Site
- Prior Spine Surgery
- ASA classification
- 3CO
- SPOs
- BMI_First Visit
- Tobacco use_First Visit
- Osteoporosis / osteopenia
- LGap
- Global Tilt
- ideal LL
- Lordosis (top of L1-S1)
- RLL
- ODI - Score (%)_First Visit
- SRS22 - SRS Total score_First Visit
- SF36 - PCS_First Visit
- SF36 - MCS_First Visit
- Major curve Cobb angle
```

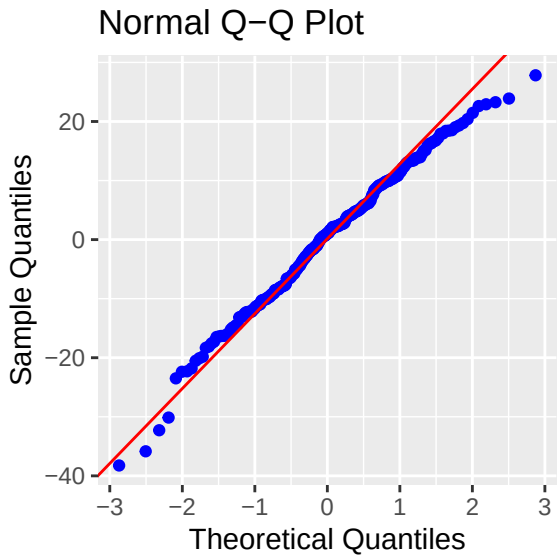
Proportion of reinterventions by year

```
   year  N prop
1:    1 59 35.8
2:    2 27 16.4
3:    3 19 11.5
4:    4 20 12.1
5:    5 15  9.1
6:    6 10  6.1
7:    7  7  4.2
8:    8  7  4.2
9:    9  1  0.6
```

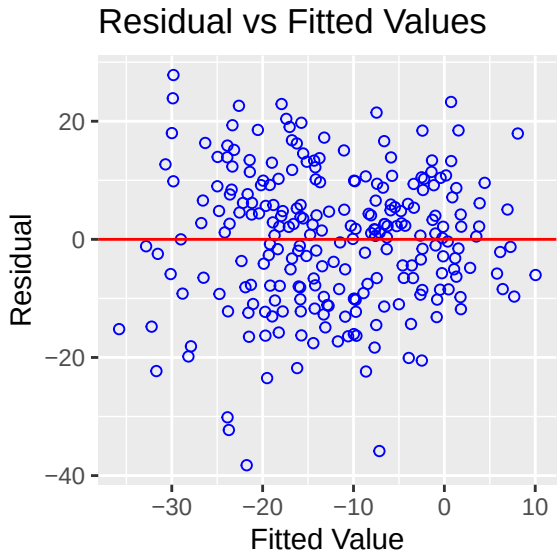
Reinterventions Impact

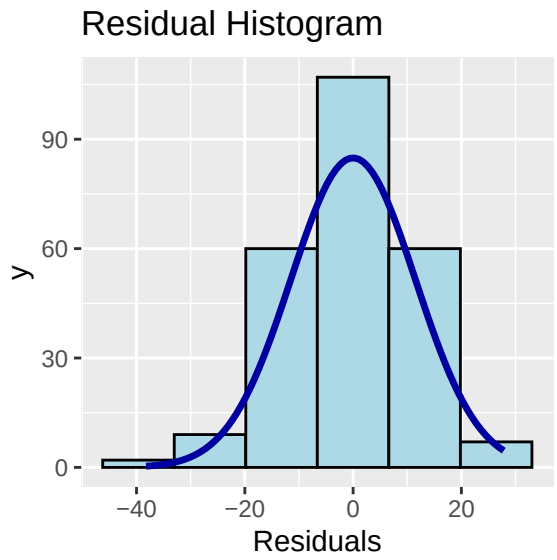
odi

```
## odi: year 1
```

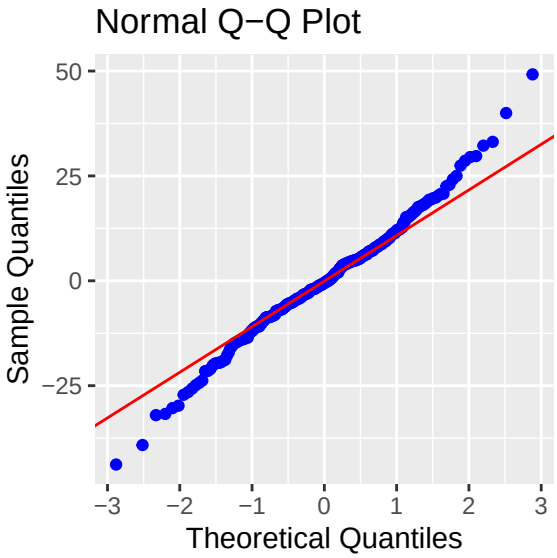



```
## ------------------------------------------------
##        Test              Statistic       pvalue
## ------------------------------------------------
## Shapiro-Wilk              0.9908         0.1244
## Kolmogorov-Smirnov        0.0464         0.6667
## Cramer-von Mises         18.9758         0.0000
## Anderson-Darling          0.4165         0.3293
## ------------------------------------------------
```

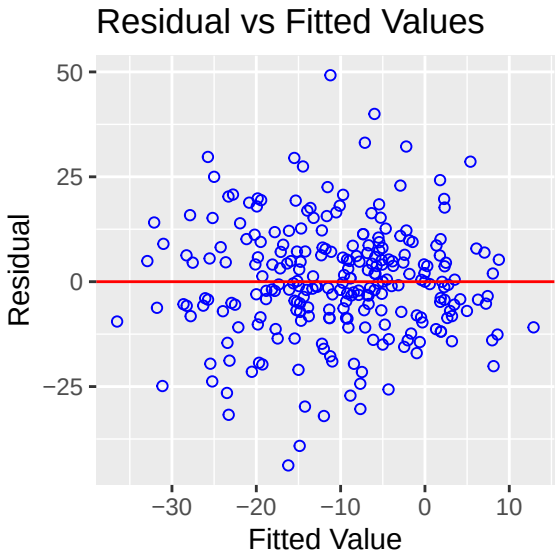


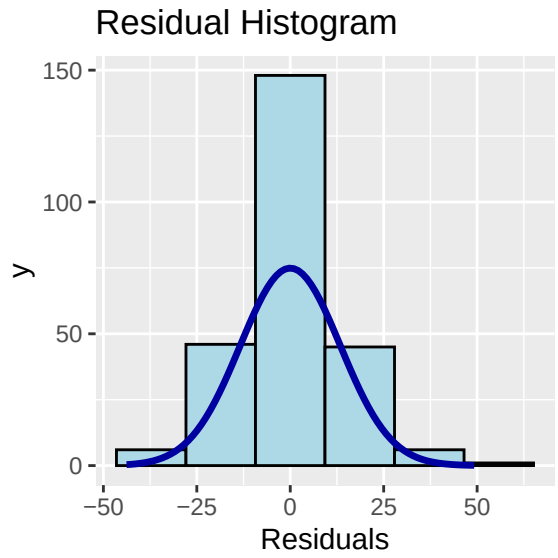



```
##
##
##
## odi: year 2
```

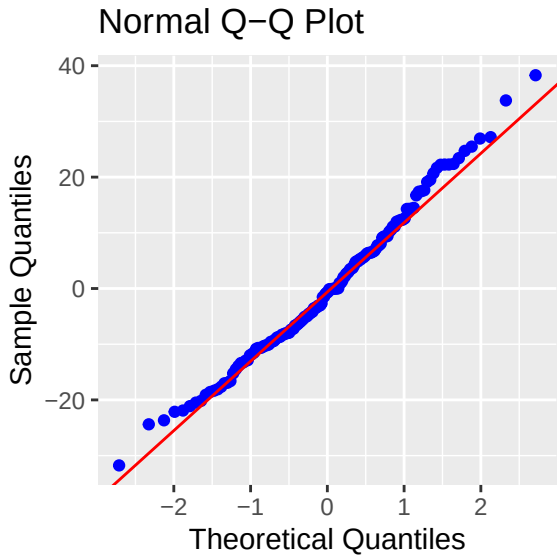



```
## ------------------------------------------------
##         Test              Statistic       pvalue
## ------------------------------------------------
## Shapiro-Wilk               0.9896         0.0683
## Kolmogorov-Smirnov         0.0495         0.5686
## Cramer-von Mises          20.1781         0.0000
## Anderson-Darling           0.8017         0.0374
## ------------------------------------------------
```

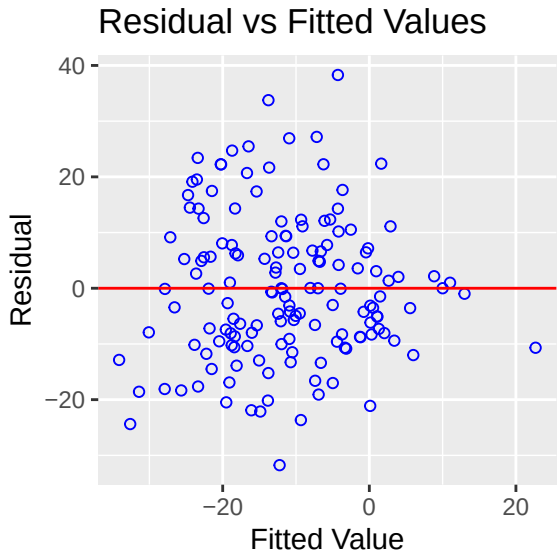

Residual vs Fitted Values
Residual
50
25
0
−25
−30
−20
−10
0
10
Fitted Value

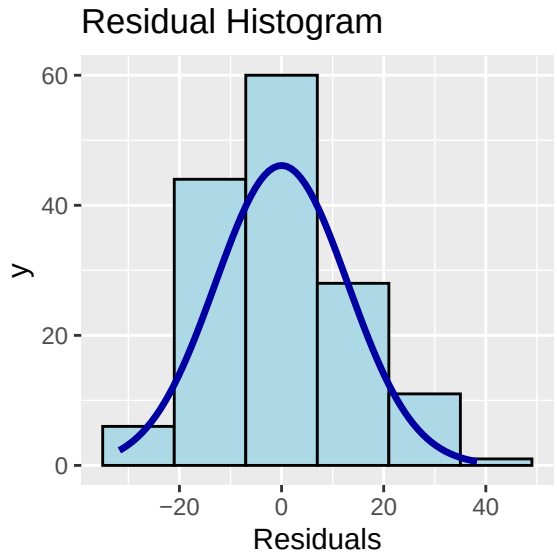

Residual Histogram
y
150
100
50
0
−50
−25
0
25
50
Residuals

```
##
##
##
## odi: year 3
```

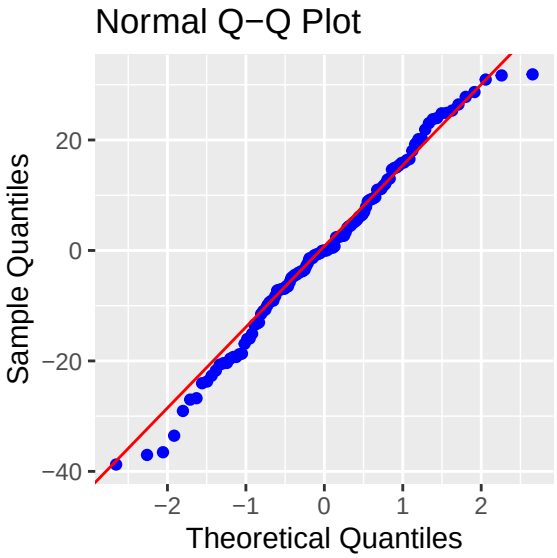



```
## -----------------------------------------------
##         Test              Statistic       pvalue
## -----------------------------------------------
## Shapiro-Wilk               0.9884         0.2482
## Kolmogorov-Smirnov         0.0586         0.6810
## Cramer-von Mises          12.9804         0.0000
## Anderson-Darling           0.555          0.1497
## -----------------------------------------------
```

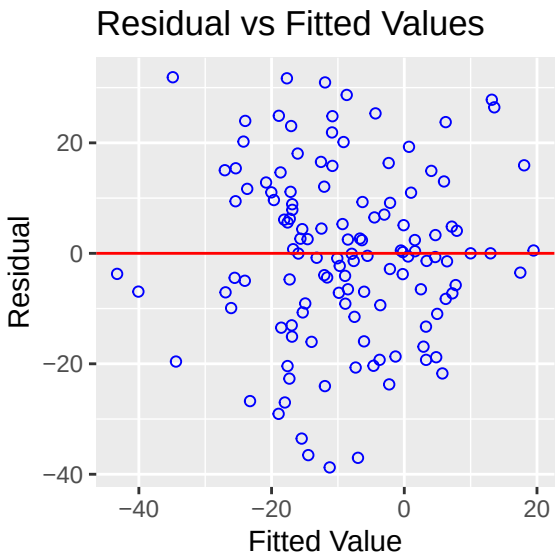


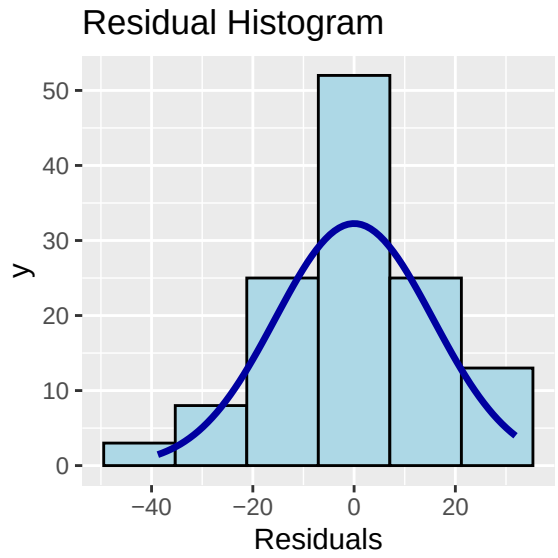



```
##
##
##
## odi: year 4
```

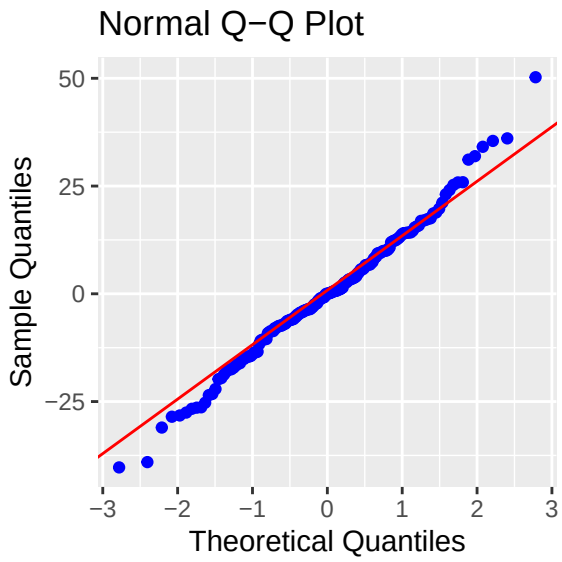



```
## ------------------------------------------------
##         Test             Statistic       pvalue
## ------------------------------------------------
## Shapiro-Wilk               0.9889         0.4052
## Kolmogorov-Smirnov         0.0511         0.8972
## Cramer-von Mises           9.6042         0.0000
## Anderson-Darling           0.2901         0.6067
## ------------------------------------------------
```

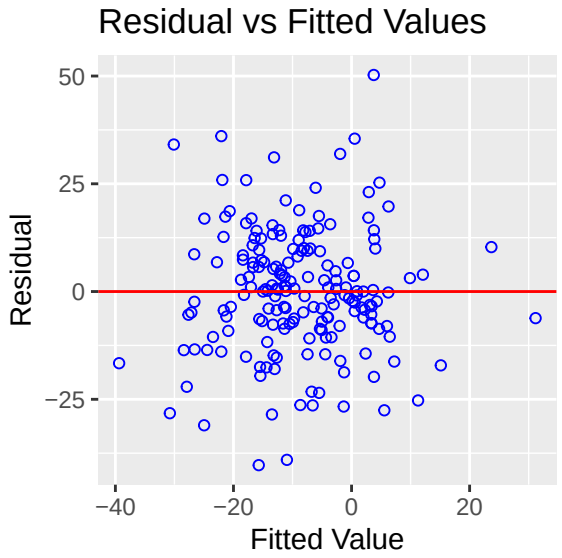

Residual vs Fitted Values
Residual
20
0
−20
−40
−40
−20
0
20
Fitted Value

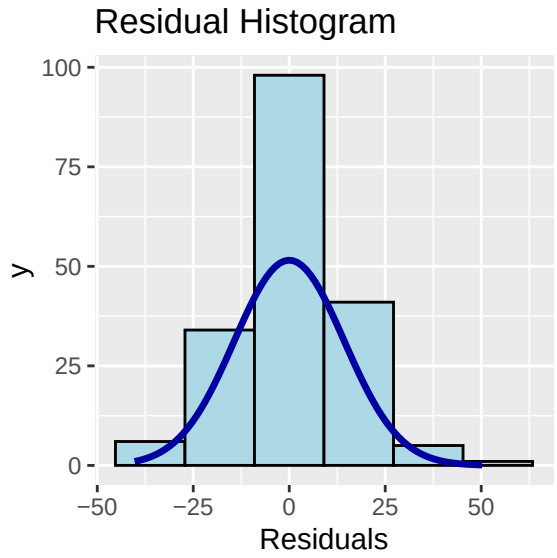

Residual Histogram
y
50
40
30
20
10
0
−40
−20
0
20
Residuals

```
##
##
##
## odi: year 5
```



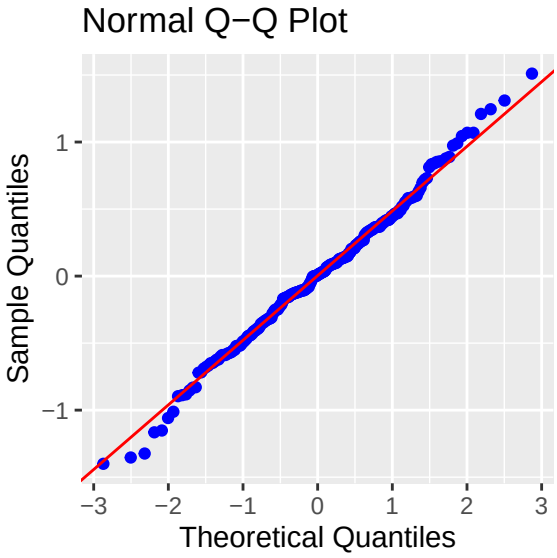

```
## ------------------------------------------------
##         Test              Statistic       pvalue
## ------------------------------------------------
## Shapiro-Wilk               0.9904         0.2500
## Kolmogorov-Smirnov         0.0512         0.7181
## Cramer-von Mises          13.8235         0.0000
## Anderson-Darling           0.5239         0.1799
## ------------------------------------------------
```



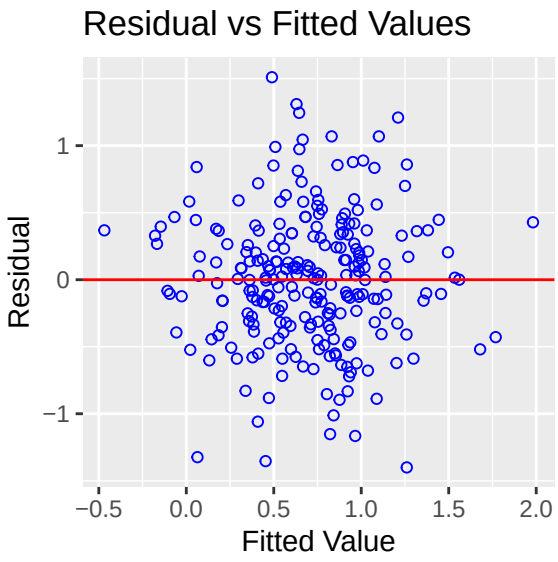


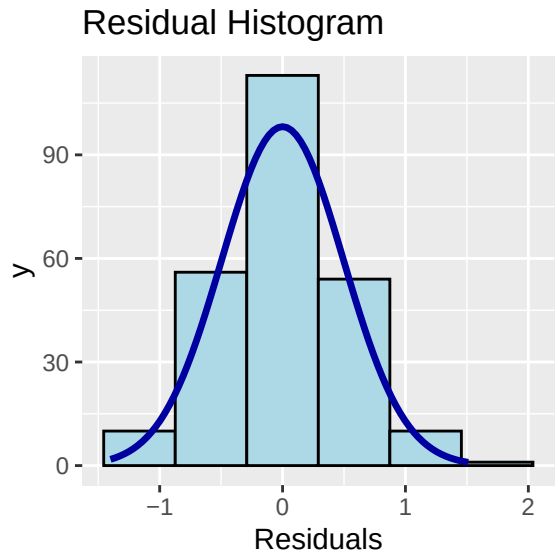
srss

```
## srss: year 1
```

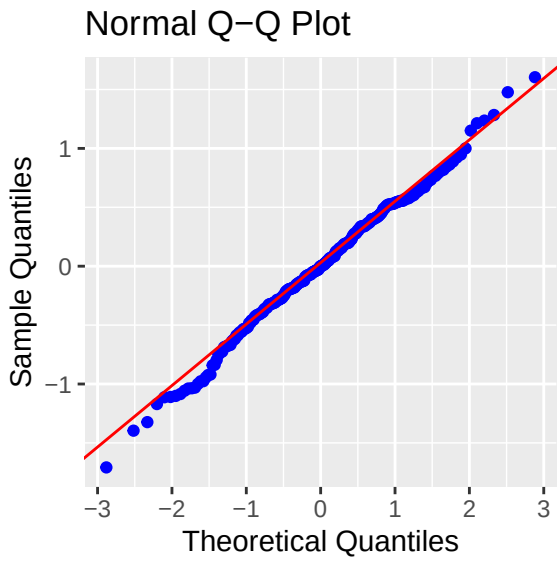



```
## ------------------------------------------------
##        Test             Statistic       pvalue
## ------------------------------------------------
## Shapiro-Wilk              0.9942         0.4692
## Kolmogorov-Smirnov        0.0468         0.6584
## Cramer-von Mises          30.579         0.0000
## Anderson-Darling          0.4257         0.3131
## ------------------------------------------------
```

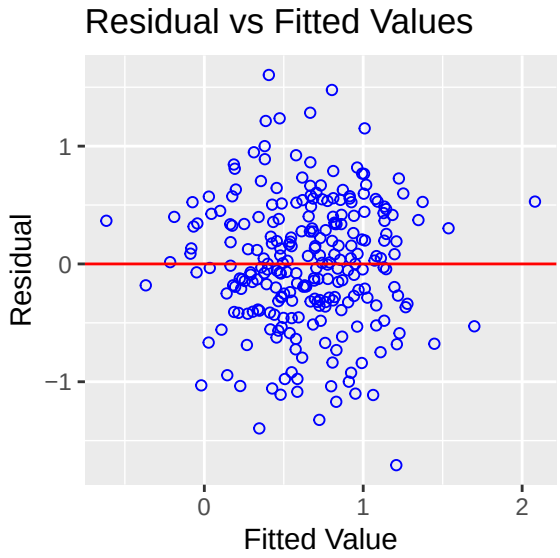

Residual vs Fitted Values
Residual
1
0
−1
−0.5
0.0
0.5
1.0
1.5
2.0
Fitted Value

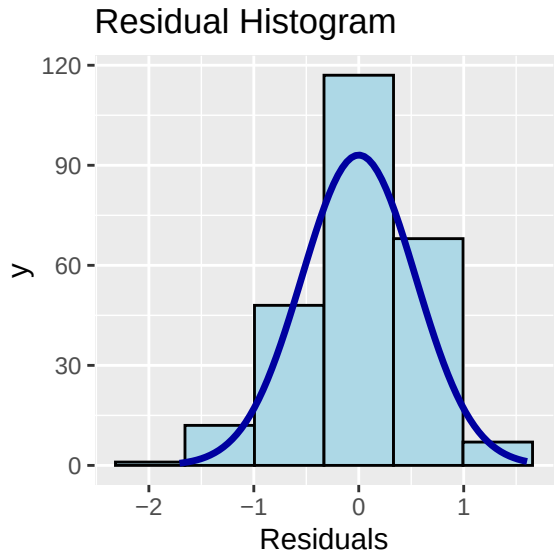

Residual Histogram
y
90
60
30
0
−1
0
1
2
Residuals

```
##
##
##
## srss: year 2
```

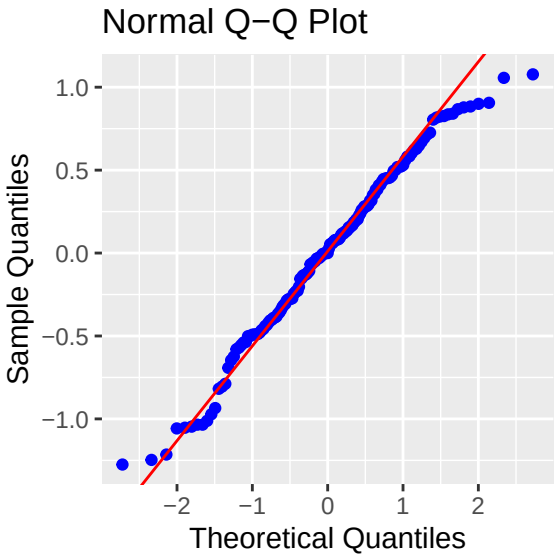



```
## ----------------------------------------------
##         Test              Statistic       pvalue
## ----------------------------------------------
## Shapiro-Wilk               0.9948         0.5469
## Kolmogorov-Smirnov         0.0332         0.9425
## Cramer-von Mises          27.3887         0.0000
## Anderson-Darling           0.4145         0.3329
## ----------------------------------------------
```

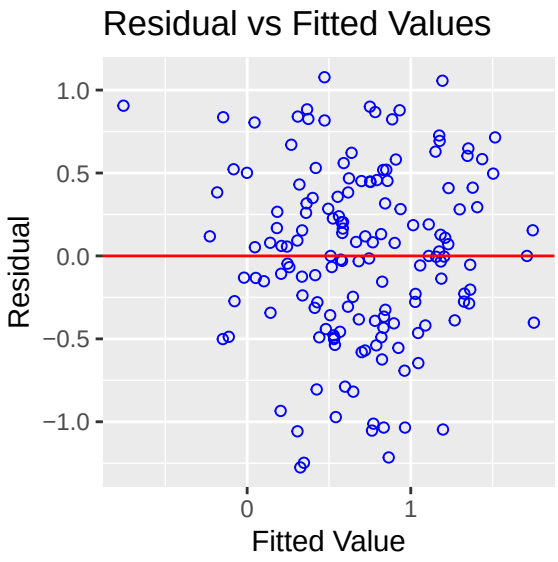


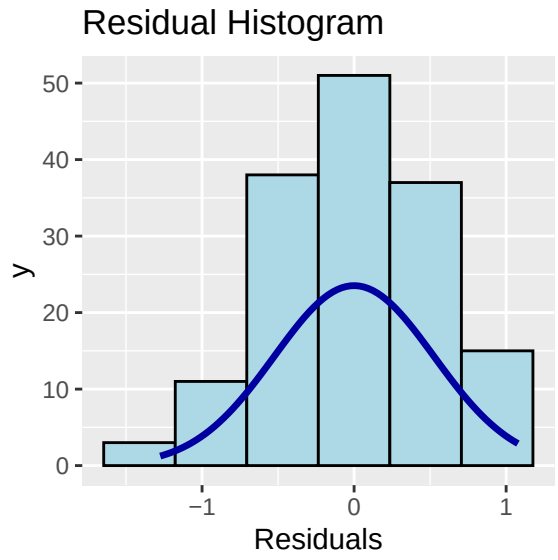



```
##
##
##
## srss: year 3
```

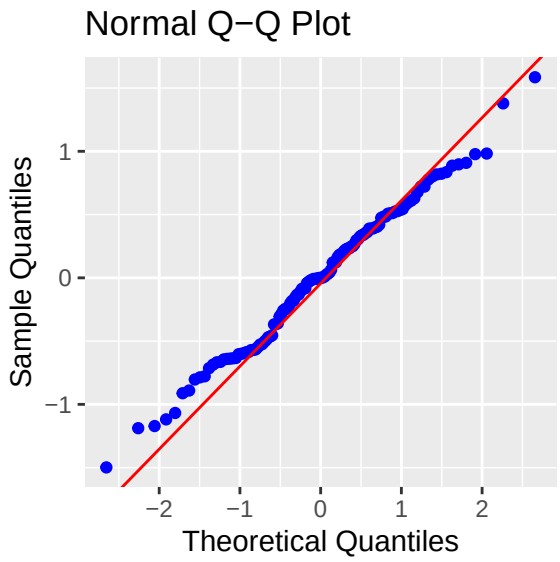



```
## ------------------------------------------------
##         Test              Statistic       pvalue
## ------------------------------------------------
## Shapiro-Wilk               0.9856         0.1087
## Kolmogorov-Smirnov         0.0423         0.9448
## Cramer-von Mises          16.3151         0.0000
## Anderson-Darling           0.3811         0.3970
## ------------------------------------------------
```

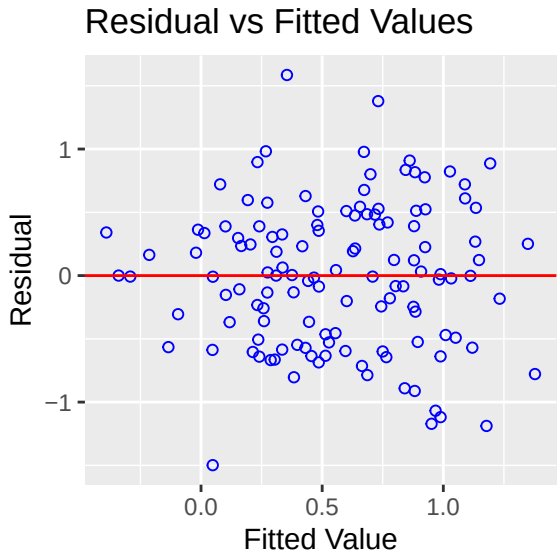

Residual vs Fitted Values
Residual
1.0
0.5
0.0
−0.5
−1.0
0
1
Fitted Value

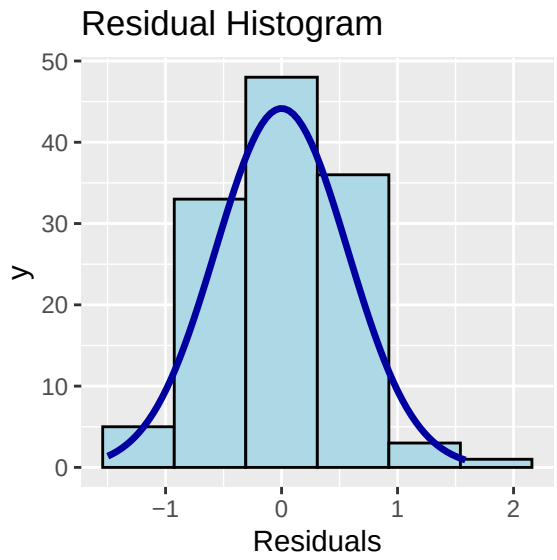

Residual Histogram
y
50
40
30
20
10
0
−1
0
1
Residuals

```
##
##
##
## srss: year 4
```

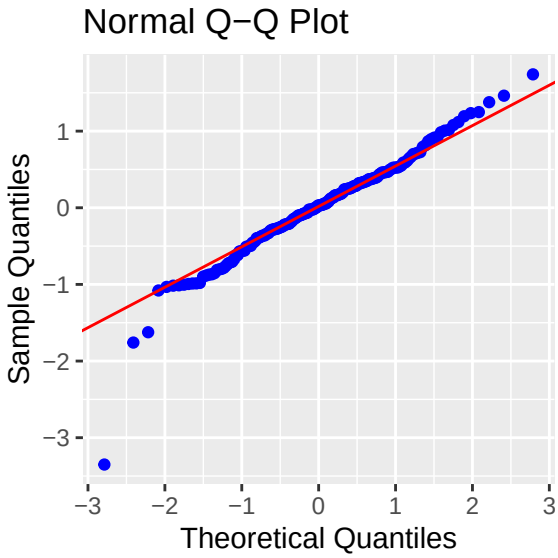



```
## -----------------------------------------------
##         Test              Statistic       pvalue
## -----------------------------------------------
## Shapiro-Wilk               0.9915         0.6406
## Kolmogorov-Smirnov         0.0657         0.6474
## Cramer-von Mises          12.4171         0.0000
## Anderson-Darling           0.4404         0.2868
## -----------------------------------------------
```

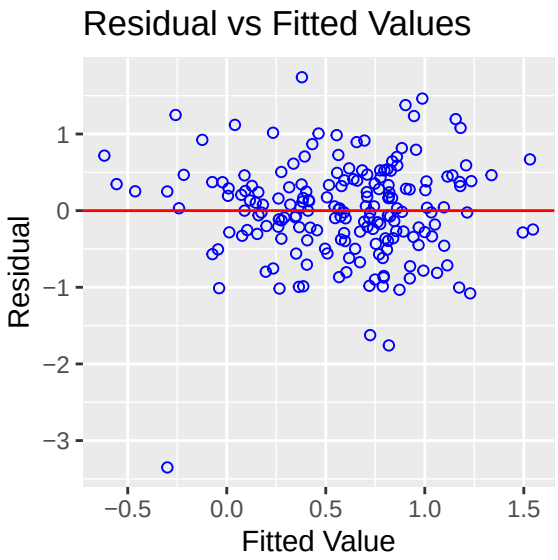


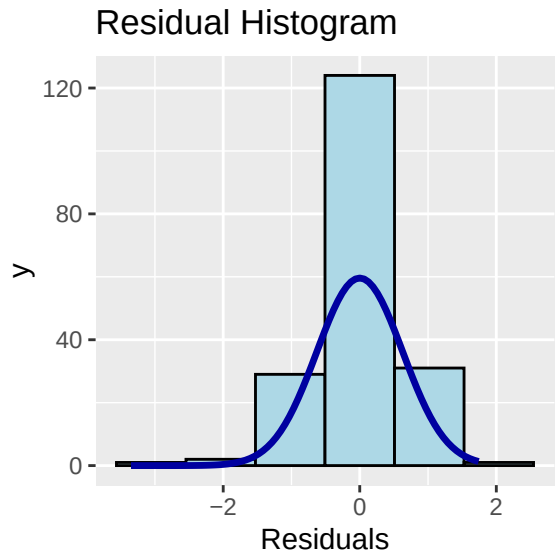



```
##
##
##
## srss: year 5
```



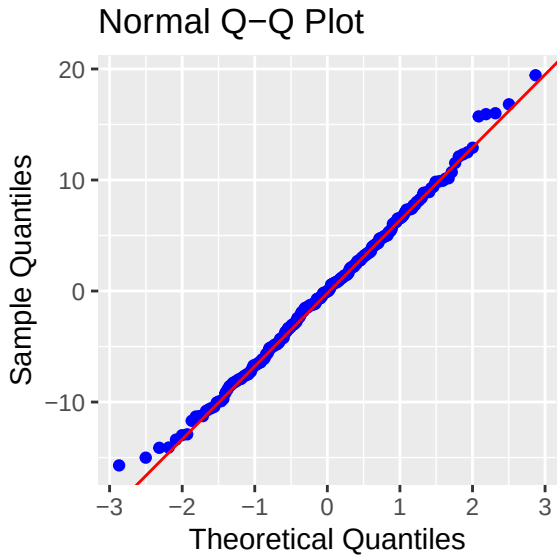

```
## ------------------------------------------------
##         Test              Statistic       pvalue
## ------------------------------------------------
## Shapiro-Wilk               0.9586         0.0000
## Kolmogorov-Smirnov         0.0564         0.5874
## Cramer-von Mises          19.1823         0.0000
## Anderson-Darling           0.8513         0.0281
## ------------------------------------------------
```



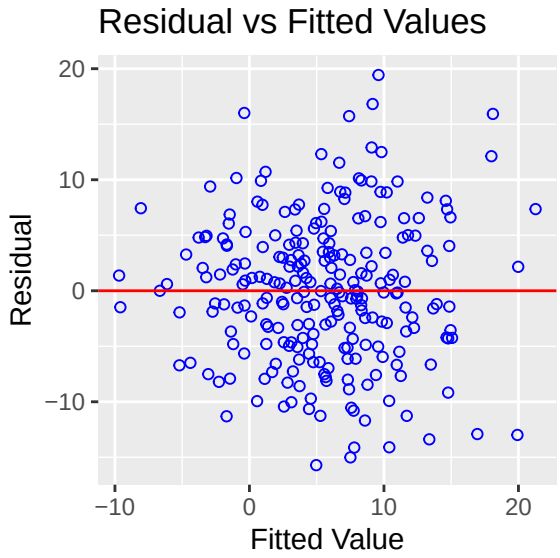


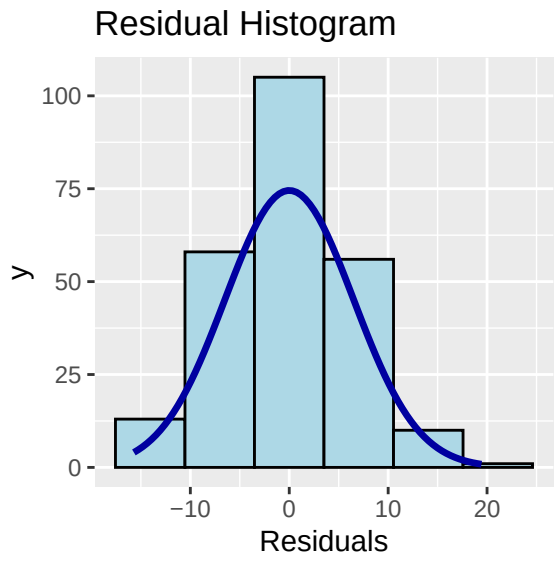
pcs

```
## pcs: year 1
```

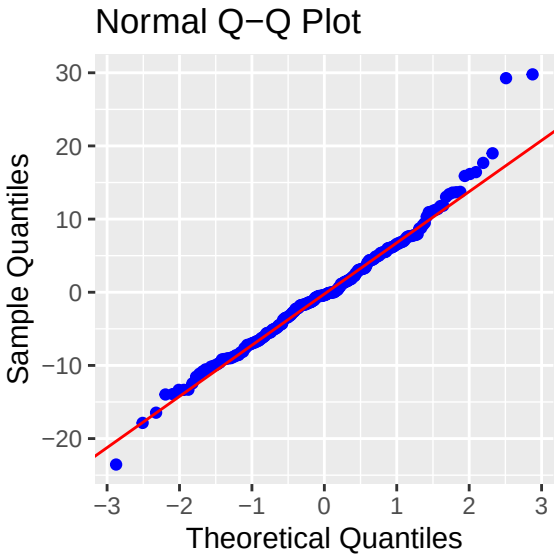



```
## ------------------------------------------------
##         Test              Statistic       pvalue
## ------------------------------------------------
## Shapiro-Wilk               0.9964         0.8457
## Kolmogorov-Smirnov         0.029          0.9866
## Cramer-von Mises           18.115         0.0000
## Anderson-Darling           0.1402         0.9737
## ------------------------------------------------
```

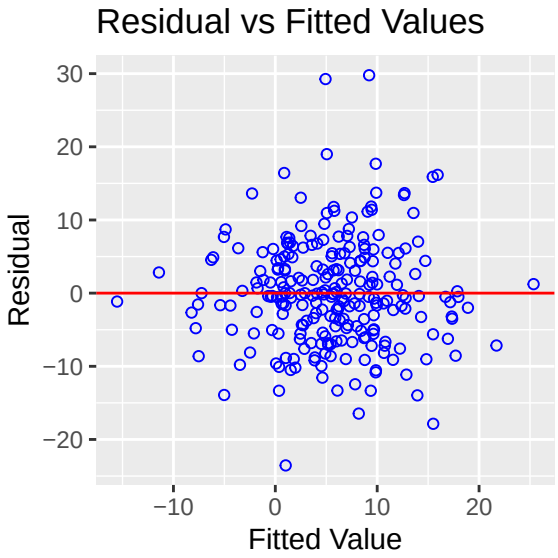


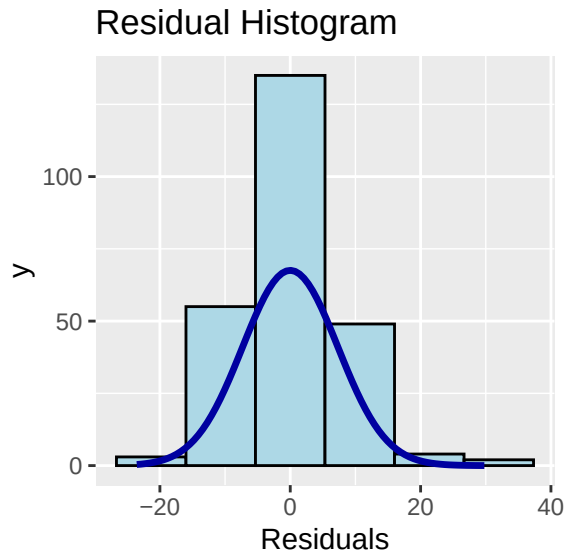



```
##
##
##
## pcs: year 2
```

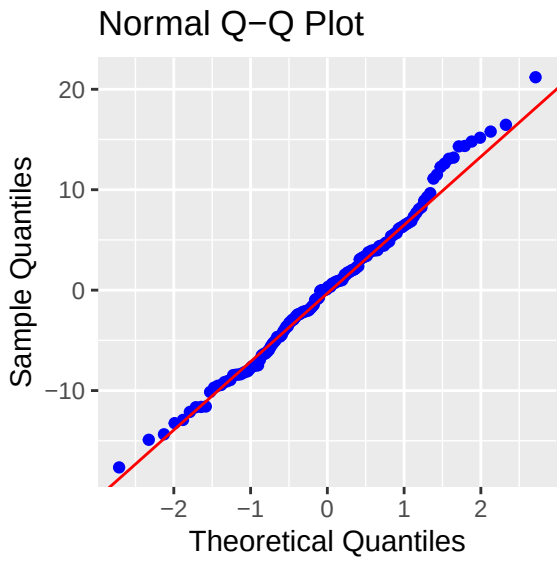



```
## ------------------------------------------------
##         Test              Statistic       pvalue
## ------------------------------------------------
## Shapiro-Wilk               0.9785          8e-04
## Kolmogorov-Smirnov         0.0562         0.4136
## Cramer-von Mises          20.6159         0.0000
## Anderson-Darling           0.8617         0.0266
## ------------------------------------------------
```

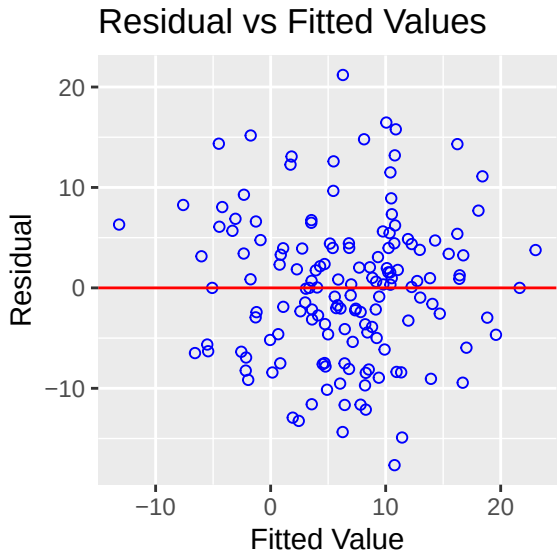

Residual vs Fitted Values
Residual
30
20
10
0
−10
−20
−10
0
10
20
Fitted Value

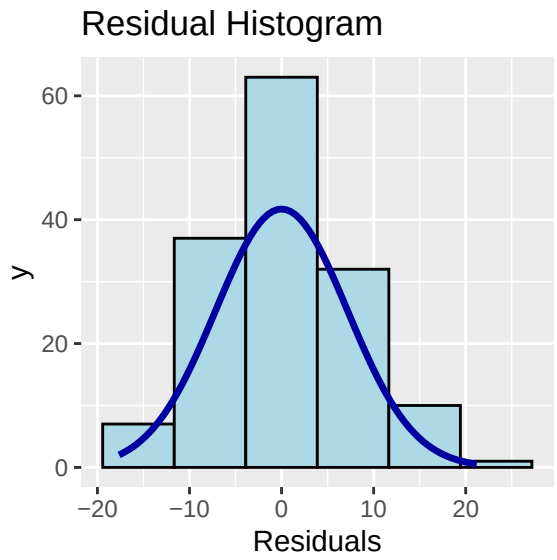

Residual Histogram
y
100
50
0
−20
0
20
40
Residuals

```
##
##
##
## pcs: year 3
```

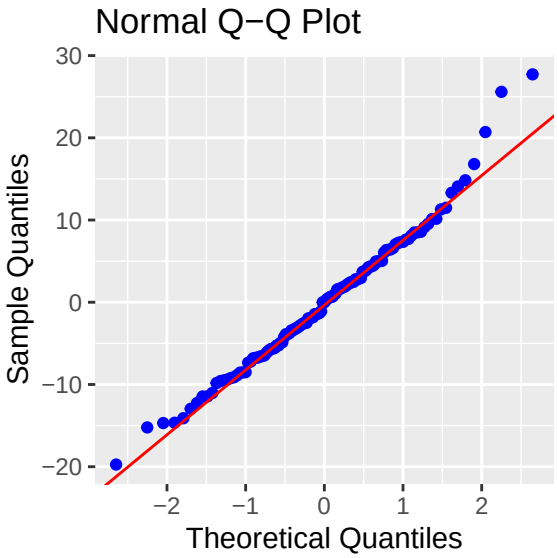



```
## -----------------------------------------------
##         Test              Statistic       pvalue
## -----------------------------------------------
## Shapiro-Wilk               0.9918         0.5396
## Kolmogorov-Smirnov         0.0424         0.9501
## Cramer-von Mises          10.7877         0.0000
## Anderson-Darling           0.352          0.4634
## -----------------------------------------------
```

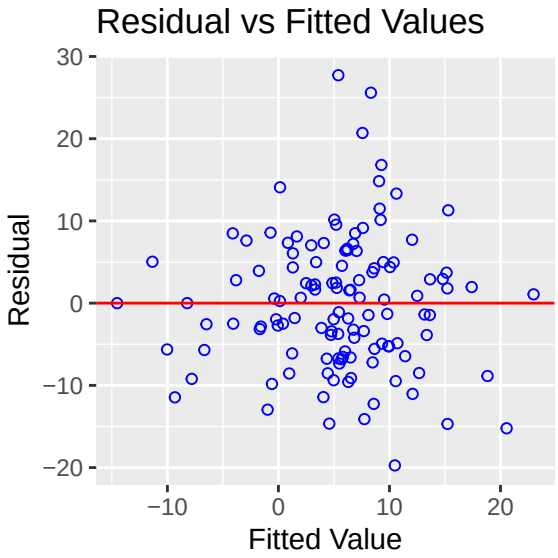


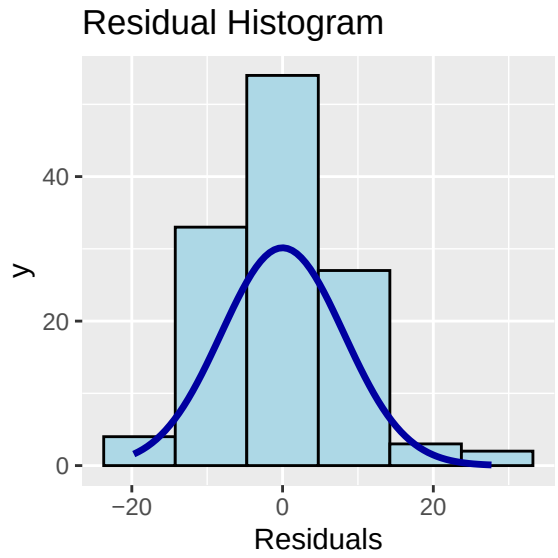



```
##
##
##
## pcs: year 4
```

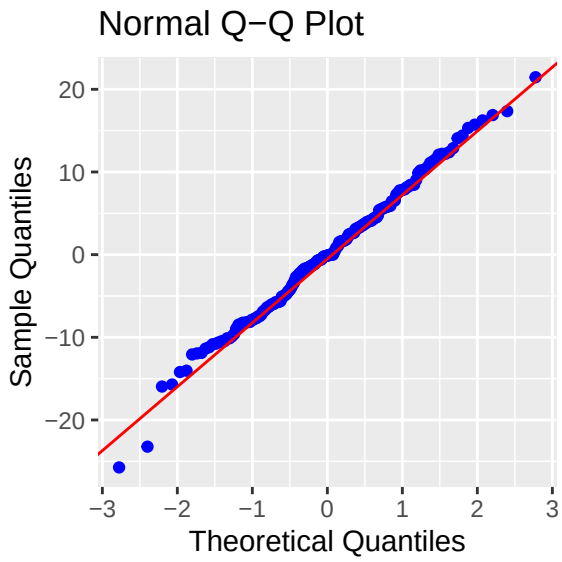



```
## ------------------------------------------------
##         Test              Statistic       pvalue
## ------------------------------------------------
## Shapiro-Wilk               0.9809         0.0796
## Kolmogorov-Smirnov         0.0437         0.9728
## Cramer-von Mises           9.1376         0.0000
## Anderson-Darling           0.3594         0.4448
## ------------------------------------------------
```

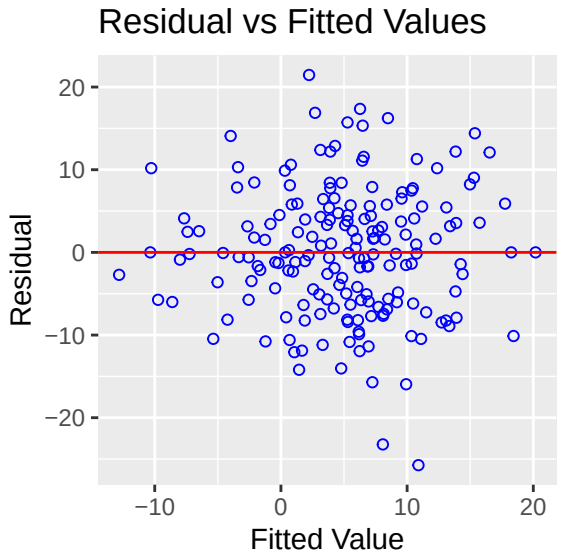

Residual vs Fitted Values
Residual
Fitted Value
30
20
10
0
−10
−20
−10
0
10
20

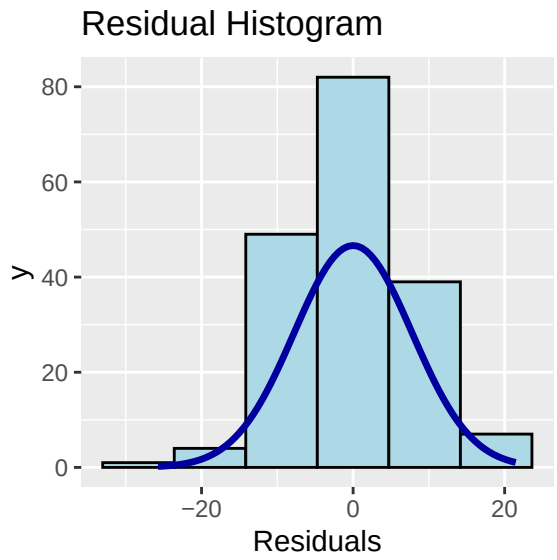

Residual Histogram
y
Residuals
40
20
0
−20
0
20

```
##
##
##
## pcs: year 5
```



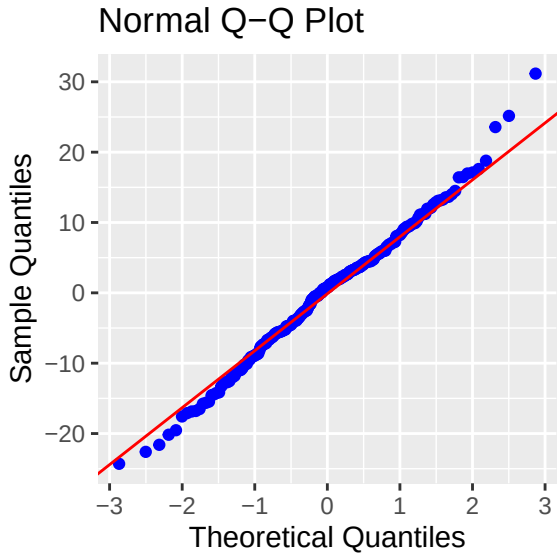

```
## ------------------------------------------------
##         Test              Statistic       pvalue
## ------------------------------------------------
## Shapiro-Wilk               0.9939         0.6606
## Kolmogorov-Smirnov         0.0351         0.9786
## Cramer-von Mises          14.8363         0.0000
## Anderson-Darling           0.2436         0.7622
## ------------------------------------------------
```



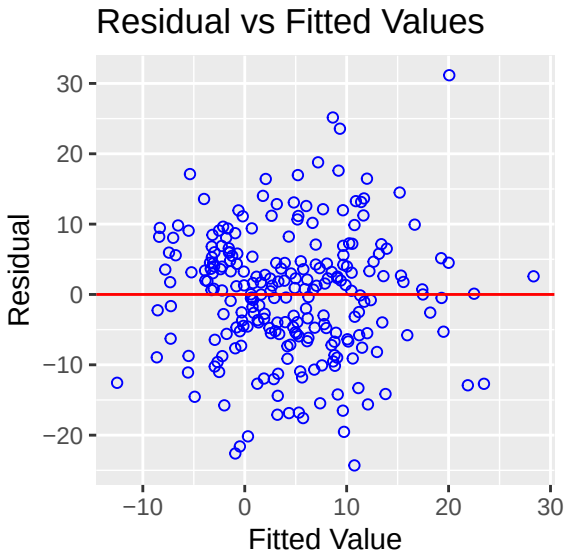


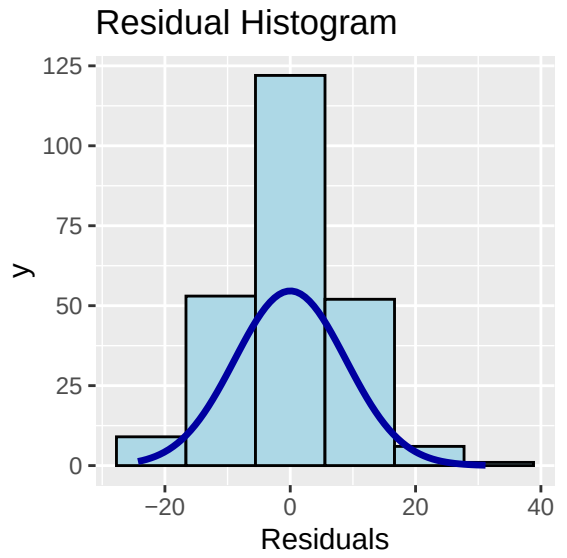
mcs

```
## mcs: year 1
```

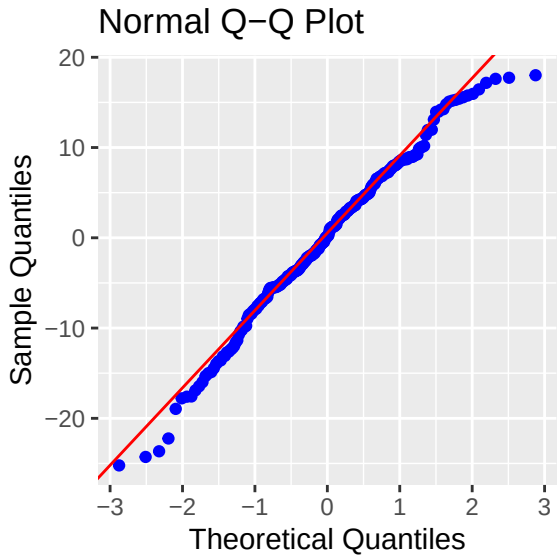



```
## ------------------------------------------------
##         Test              Statistic       pvalue
## ------------------------------------------------
## Shapiro-Wilk               0.9937         0.4008
## Kolmogorov-Smirnov         0.048          0.6314
## Cramer-von Mises           18.442         0.0000
## Anderson-Darling           0.4865         0.2233
## ------------------------------------------------
```

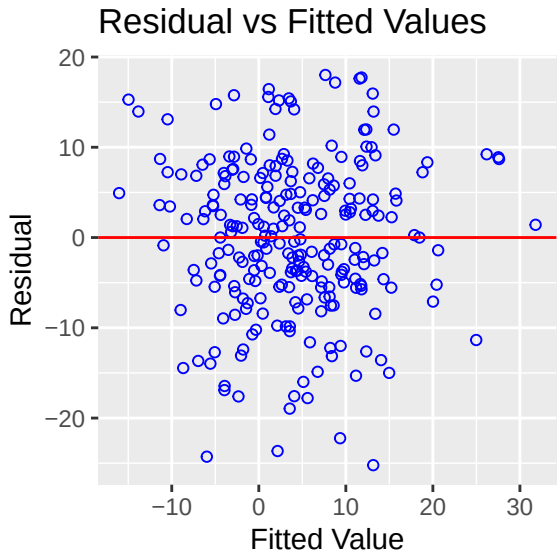

Residual vs Fitted Values
Residual
Fitted Value
30
20
10
0
−10
−20
−10
0
10
20
30

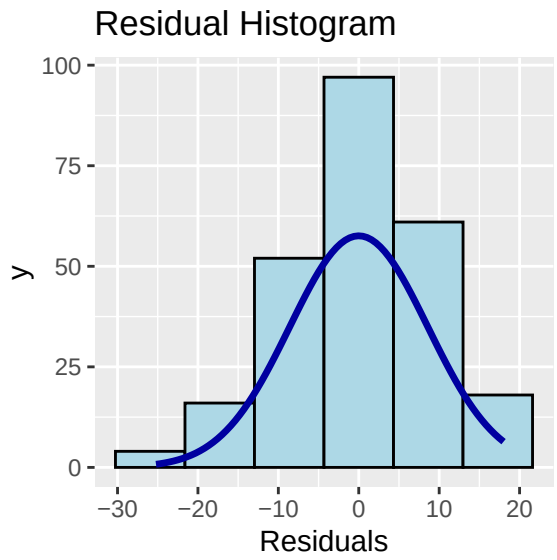

Residual Histogram
y
Residuals
125
100
75
50
25
0
−20
0
20
40

```
##
##
##
## mcs: year 2
```

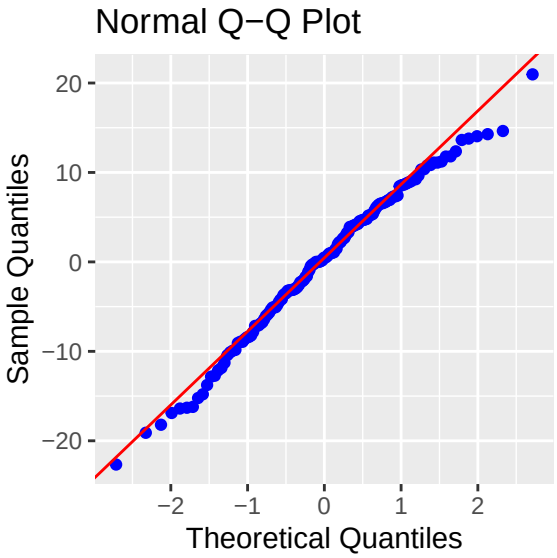



```
## -----------------------------------------------
##         Test              Statistic       pvalue
## -----------------------------------------------
## Shapiro-Wilk               0.9888         0.0513
## Kolmogorov-Smirnov         0.0449         0.6997
## Cramer-von Mises          19.9386         0.0000
## Anderson-Darling           0.5254         0.1789
## -----------------------------------------------
```

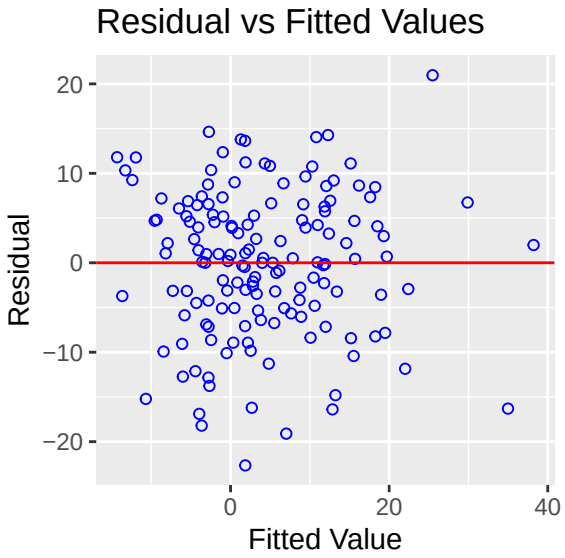


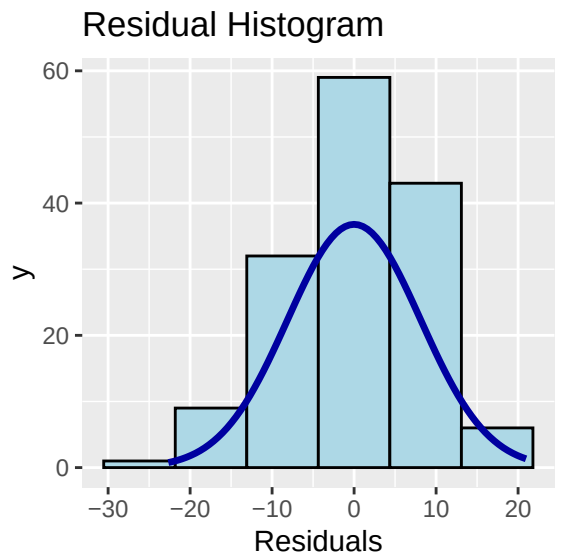



```
##
##
##
## mcs: year 3
```

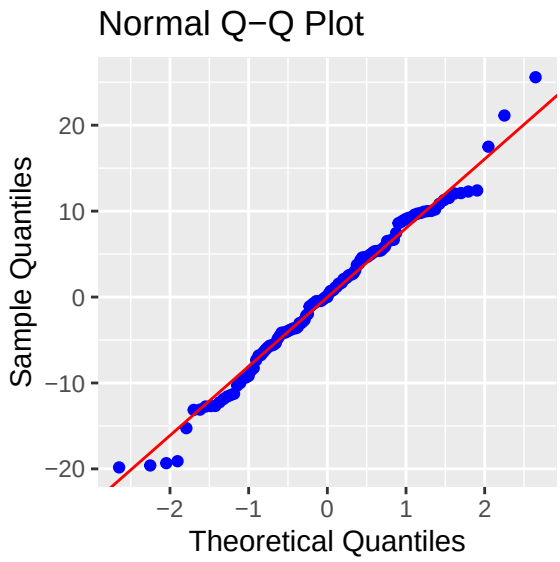



```
## ------------------------------------------------
##         Test              Statistic       pvalue
## ------------------------------------------------
## Shapiro-Wilk               0.9898         0.3477
## Kolmogorov-Smirnov         0.0577         0.6998
## Cramer-von Mises          11.1407         0.0000
## Anderson-Darling           0.4275         0.3086
## ------------------------------------------------
```

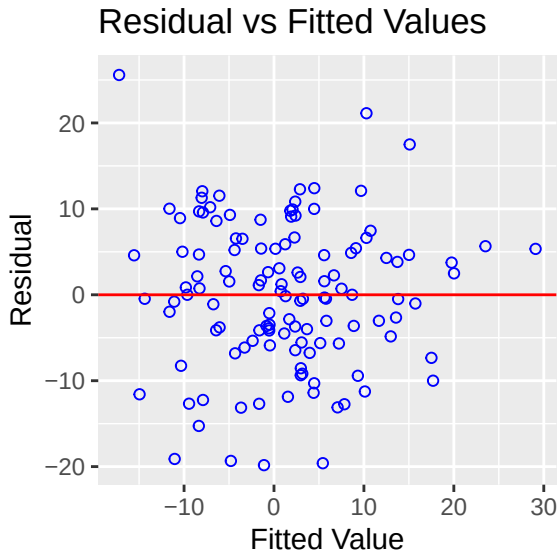

Residual vs Fitted Values
Residual
Fitted Value
20
10
0
−10
−20
0
20
40

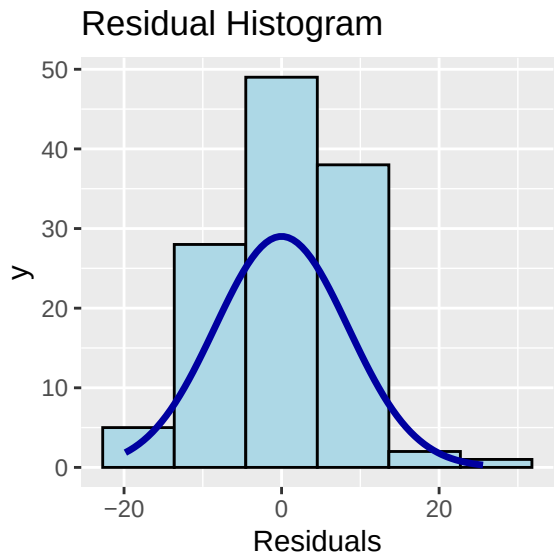

Residual Histogram
y
Residuals
60
40
20
0
−30
−20
−10
0
10
20

```
##
##
##
## mcs: year 4
```

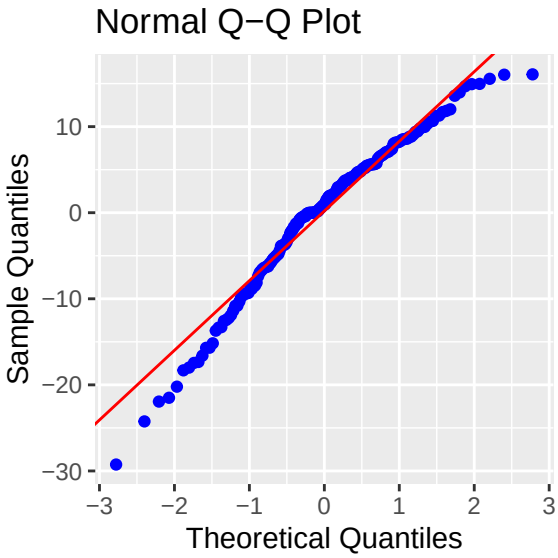



```
## -----------------------------------------------
##         Test              Statistic       pvalue
## -----------------------------------------------
## Shapiro-Wilk               0.9888         0.4183
## Kolmogorov-Smirnov         0.0468         0.9508
## Cramer-von Mises           9.5296         0.0000
## Anderson-Darling           0.3265         0.5168
## -----------------------------------------------
```

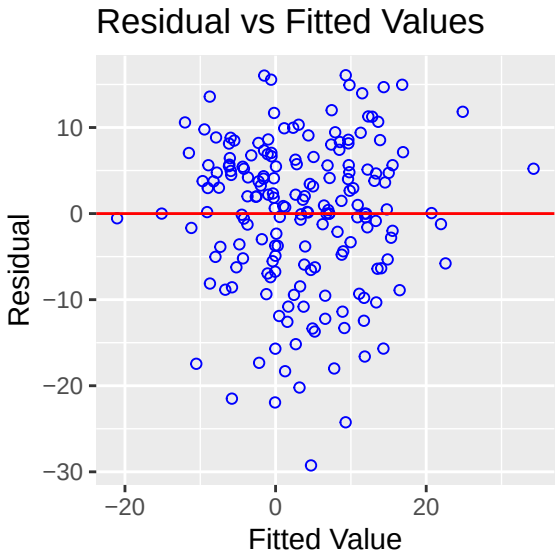


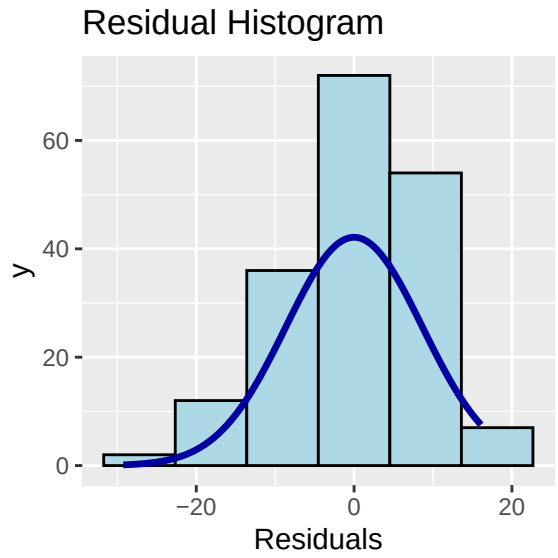



```
##
##
##
## mcs: year 5
```




```
## ------------------------------------------------
##         Test              Statistic       pvalue
## ------------------------------------------------
## Shapiro-Wilk               0.9677          3e-04
## Kolmogorov-Smirnov         0.0961         0.0682
## Cramer-von Mises          13.8304         0.0000
## Anderson-Darling           1.7221          2e-04
## ------------------------------------------------
```


Residual vs Fitted Values
Residual
10
0
−10
−20
−30
−20
0
20
Fitted Value


Residual Histogram
y
60
40
20
0
−20
0
20
Residuals