STAT 526 HW 3

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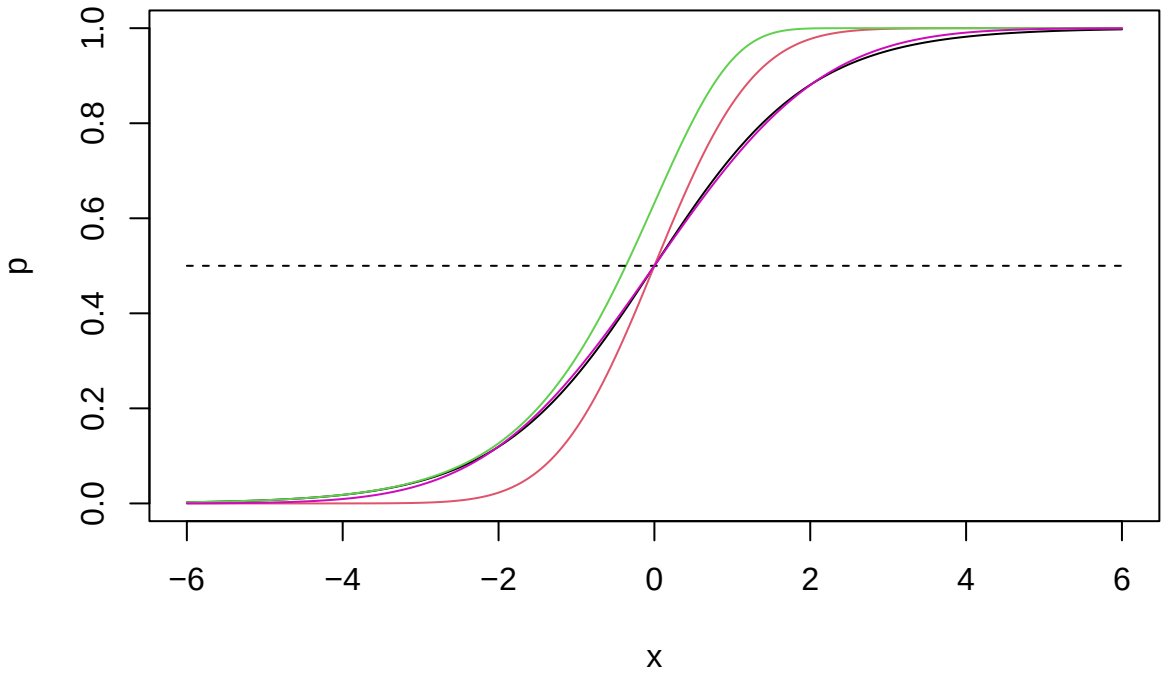
20 February 2023

Q1-a

```
x <- (-150:150)/25; plot(x,1-1/(1+exp(x)),type="l",ylab="p")
         lines(x,pnorm(x),col=2); lines(x,1-exp(-exp(x)),col=3)
         lines(c(-6,6),c(.5,.5),lty=2,col=1)
lines(x,pnorm(x,sd=1.7),col=6)
```



Q1-e

```
df <- data.frame(
        x = c(14, 29, 6, 25, 18, 4, 18, 12, 22, 6, 30, 11, 30, 5,
            20, 13, 9, 32, 24, 13, 19, 4, 28, 22),
        y = c(0, 0, 0, 1, 1, 0, 0, 0, 1, 0, 1, 0, 1, 0, 1, 0,
            0, 1, 0, 1, 0, 0, 1, 1)
        )

# train the glm
df.lgt0 <- glm(y ~ x, family = binomial, data = df)
summary(df.lgt0)
```

```
##
## Call:
## glm(formula = y ~ x, family = binomial, data = df)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.0201  -0.5988  -0.2745   0.6294   1.8319
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept) -4.21134    1.66304  -2.532   0.0113 *
## x            0.21078    0.08187   2.574   0.0100 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 32.601  on 23  degrees of freedom
## Residual deviance: 20.978  on 22  degrees of freedom
## AIC: 24.978
##
## Number of Fisher Scoring iterations: 5
```

```
anova(df.lgt0)
```

```
## Analysis of Deviance Table
##
## Model: binomial, link: logit
##
## Response: y
##
## Terms added sequentially (first to last)
##
##
##      Df Deviance Resid. Df Resid. Dev
## NULL                    23     32.601
## x     1   11.623        22     20.978
```

```
summary(df.lgt0)
```

```
##
## Call:
## glm(formula = y ~ x, family = binomial, data = df)
##
## Deviance Residuals:
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## AIC: 24.978
##
## Number of Fisher Scoring iterations: 5
```
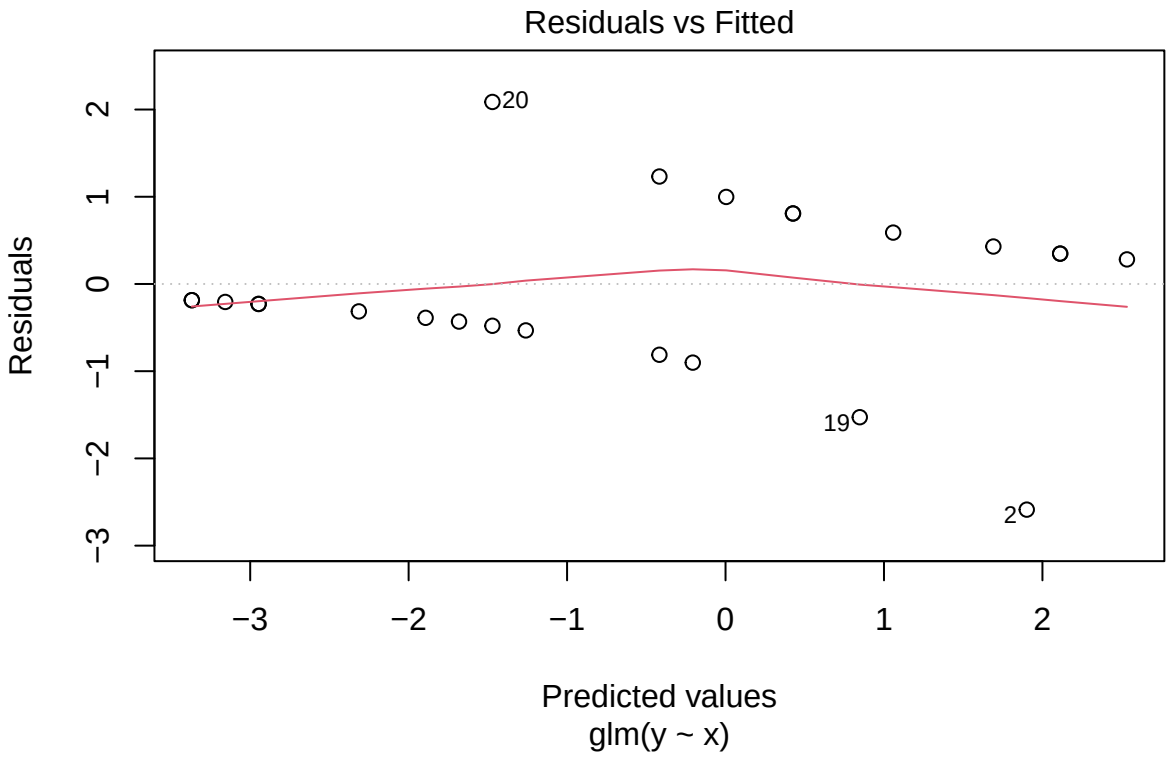
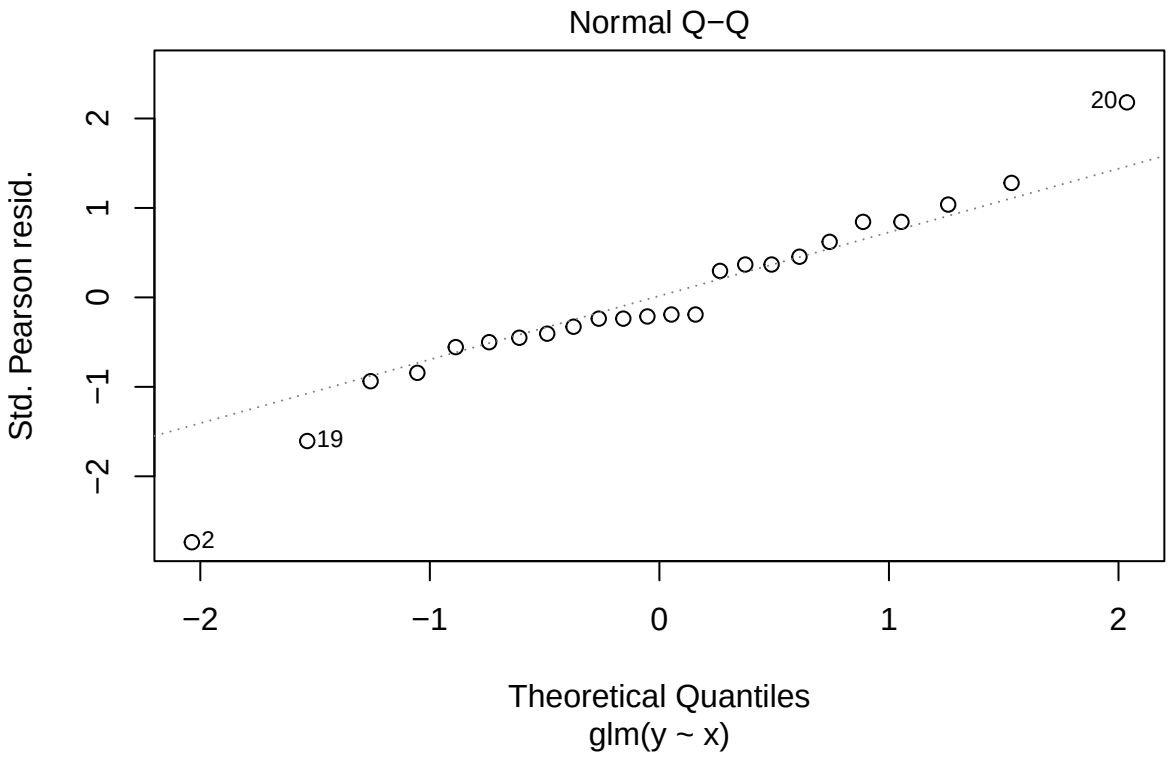
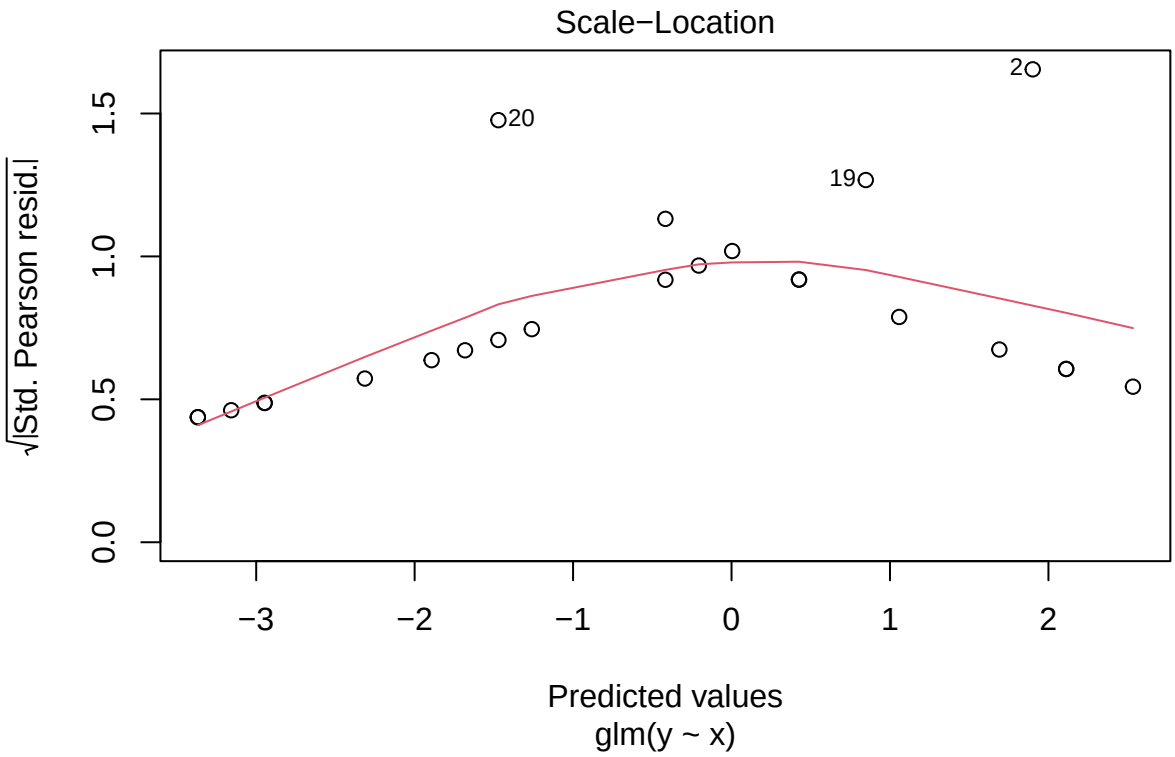
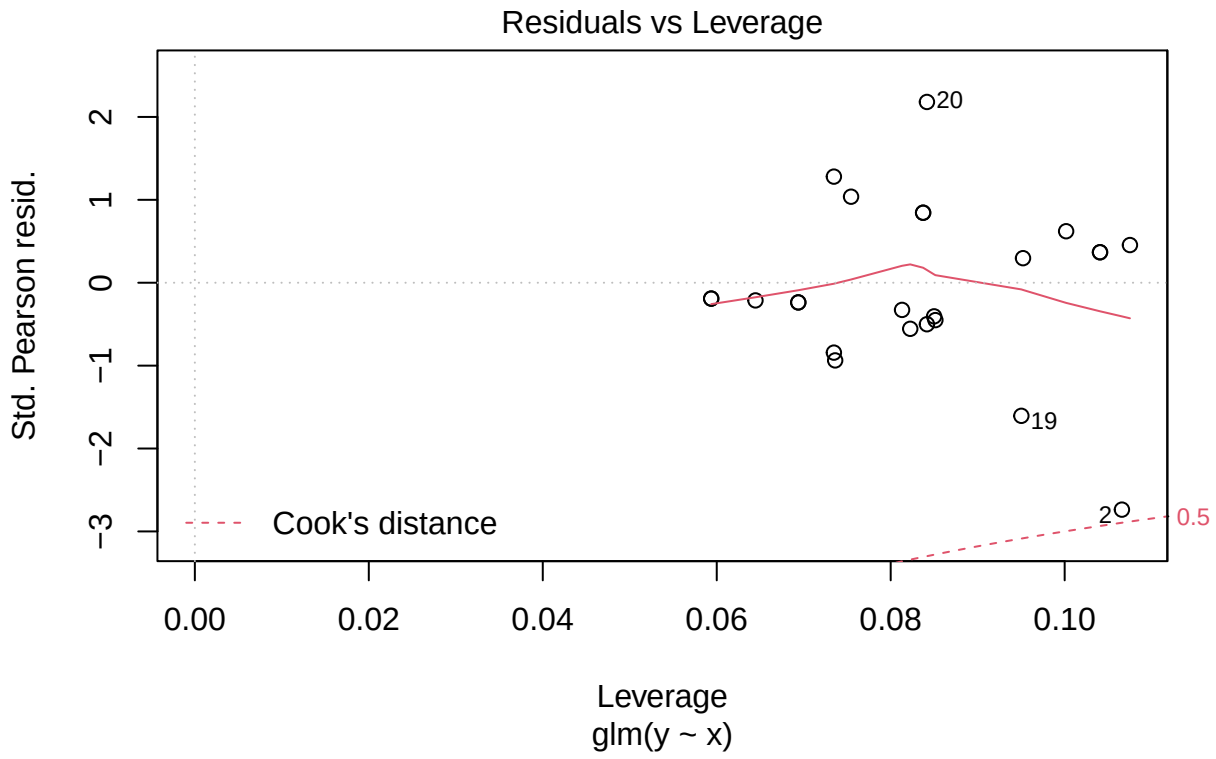

```
plot(df.lgt0)
```


Residuals vs Fitted
Residuals
Predicted values
glm(y ~ x)
20
19
2
−3
−2
−1
0
1
2


Normal Q−Q
Std. Pearson resid.
−2
−1
0
1
2
20
19
2
−2
−1
0
1
2
Theoretical Quantiles
glm(y ~ x)


Scale−Location
√|Std. Pearson resid.|
0.0
0.5
1.0
1.5
20
19
2
−3
−2
−1
0
1
2
Predicted values
glm(y ~ x)




```
df.lgt1 <- glm(y ~ 1, family = binomial(link = probit), data = df)
df.lgt1
```

```
##
## Call:  glm(formula = y ~ 1, family = binomial(link = probit), data = df)
##
## Coefficients:
## (Intercept)
##     -0.2104
##
## Degrees of Freedom: 23 Total (i.e. Null);  23 Residual
## Null Deviance:       32.6
## Residual Deviance: 32.6  AIC: 34.6
```