Question 6.1

a. The fitted-line plot (Figure 1) suggests that the logistic regression model fits the proportions that had seen an x-rated movie by age fairly well as indicated by the relative closeness of the modeled line to the observed proportions (i.e., blue pluses).

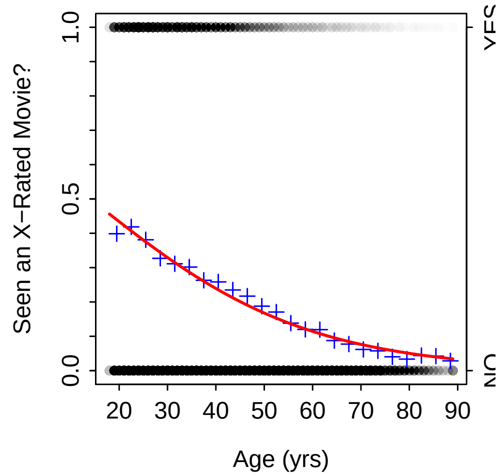

Figure 1. Fitted plot for the logistic regression of whether or not the respondent had seen an x-rated movie and the respondent's age.

b. The estimated slope indicates that the log odd that a respondent has seen an x-rated movie decrease between 0.0425 and 0.0466, on average, for every increase in age by one year.

c. The back-transformed estimated slopes indicates that the odds that a respondent has seen an x-rated movie are between 0.9545 and 0.9584 as much after an increase of one year.

d. The log odds of having seen an x-rated movie for a 50-year-old is computed with 0.6255+-0.0445*50 = -1.6017.

e. The log odds of having seen an x-rated movie for a 50-year-old as computed in R is -1.6017 as seen below.

```
> ( log50 <- predict(glm1,data.frame(age=50)) )
        1
-1.601733
```

f. The odds of having seen an x-rated for a 50-year-old is 0.2015 as computed with $e^{-1.6017}$.

g. The probability of having seen an x-rated for a 50-year-old is computed with $\frac{0.2015}{1+0.2015}$=0.1677.

h. The probability of having seen an x-rated for a 50-year-old as computed in R is 0.1677 as seen below.

```
> ( p50 <- predict(glm1,data.frame(age=50),type="response") )
        1
0.1677395
```

i. The probability of having seen an x-rated movie for a 30-year old is 0.3294. Thus, the odds that a 30-year old has seen an x-rated movie is $\frac{0.3294}{1-0.3294}$=0.4912.

j. The probability of having seen an x-rated movie for a 31-year old is 0.3197. Thus, the odds that a 31-year old has seen an x-rated movie is $\frac{0.3197}{1-0.3197}$=0.4698. The ratio of the odds for the 31-year-old to the odds of the 30-year-old is $\frac{0.4698}{0.4912}$ = 0.9564, which is the same as the back-transformed slope (i.e., $e^{-0.0445}$).