Use the Galton dataset found within the mosaic package to answer the following questions.

> library(mosaic)

> View(Galton)

> ?Galton

We know that in general men are taller than women. Thus, it seems logical that the height of a person could be used to predict their gender. Use the Galton dataset to produce a logistic regression model that allows us to predict the probability that the gender of an individual is male (sex == "M") given the height of the individual.

The logistic regression model for these data is given by

$$P(Y_i = \text{Male}) = \frac{e^{\beta_0+\beta_1 \text{height}_i}}{1+e^{\beta_0+\beta_1 \text{height}_i}}$$

The estimated values for the coefficients of this equation are given in R as

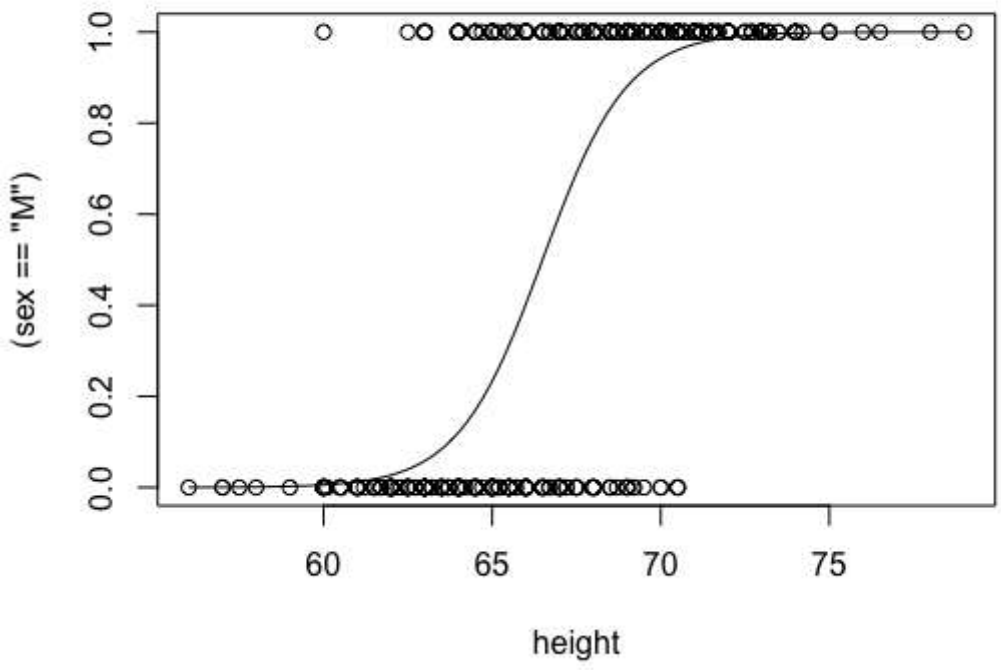
$\beta_0 \approx$ -52.98

$\beta_1 \approx$ 0.7968

Create a graphic for this logistic regression. It should look like the following image.

Were you able to make this same plot in R?

- (●) Yes
- ( ) No



This plot shows that the logistic regression is a good fit for these data.

Select all statements that are correct for this logistic regression.

- [x] For every one inch increase in the height of an individual, the odds that they will be a male increases by a factor of 2.2. In other words, the odds of the person being a male more than doubles for every one inch increase in height.
- [ ] The probability that an individual is male if they are 60 inches tall is 0.212.
- [ ] For every one inch increase in the height of an individual, the odds that they will be a male decreases by a factor of 0.79683 In other words, the odds of the person being a male drops by about a third for every one inch increase in height.
- [x] The probability that an individual is male if they are 70 inches tall is 0.942.
- [x] There is about a 50% chance that the individual is Male (or Female) if they are 66.5 inches tall.

Use your model to predict the probability that a person who is 65 inches tall is male.

0.2332

Conduct Hosmer and Lemeshow's Goodness of Fit test **with g=10** to confirm that this simple logistic model is appropriate to use height to predict sex. The p-value of the test is 0.9896 . This shows there is insufficient evidence to reject the null hypothesis that the logistic regression is a good fit for these data. In other words, the model looks really good.