

Worksheet 1: Categorical Testing

Questions from Part 1

1. State the appropriate set of hypotheses for this test. Also state how many faces your die had.

$$\# \text{ of faces} = 10$$

H_0 : Die is not fair \Rightarrow Probability of getting at least 1 face is different

H_1 : Die is fair $\Rightarrow P(0) = P(1) = P(2) = P(3) = P(4) = P(5) = P(6) = P(7) = P(8) = P(9)$

2. What is the p-value from the χ^2 table? What is the p-value from R?

$$P\text{-val from } \chi^2 < 2.2e-16$$

3. Can you conclude the die is unfair? Explain.

Since p-val is small, we reject H_0 and accept H_1 .
So, we can conclude the die is fair

4. Were all of your assumptions for the validity of this test met? Explain.

Yes, all expected counts were greater than 3.

Questions from Part 2

1. Write down both of the questions that you asked your fellow classmates.

Are you a undergrad / grad?

Do you use windows/mac?

2. Realistically, do you believe that these two variables could be related? Explain.

No, I do not think they are. What type of computer has more to do with your major rather than whether you are an undergrad / grad.

3. State the set of hypotheses for this test.

H_0 : OS type is independent of you're an undergrad/grad.

H_1 : OS type and level of study are related.

4. State your p-value for the test.

0.4714

5. What can you conclude regarding the dependence of your variables?

Large p-val so, cannot conclude anything.

H_0 is plausible

6. Were all of your assumptions for the validity of this test met? Explain.

No, 2 of my expected counts were only 2.

7. If you were to choose ONE of the questions you asked your classmates, how would this translate into a χ^2 goodness of fit test? Explain by writing an appropriate set of null and alternate hypotheses.

H_0 : Mac = Windows

H_1 : Mac \neq Windows

Questions from Part 3

1. What type of test does this most closely align with: Goodness of Fit, Homogeneity, Independence?

Independence

2. State the set of hypotheses for this test.

H_0 : They are independent

H_1 : They are dependent

3. What can you conclude from this test?

$\chi^2 = 20.925$ dof = 8 p-val = 0.00735

Small p-val, reject null, accept H_1 , so hair and eye color are dependent.

Worksheet 2: Linear RegressionQuestions from Part 1

1. Based on the scatterplot alone, what do you believe a good estimate for r would be?

There seems to be a trend of $x \uparrow y \uparrow$
So, 0.5 would be a good estimate for r

2. What is the correlation coefficient computed by R?

$$r = 0.524276$$

3. What are the values for $\hat{\beta}_0$ and $\hat{\beta}_1$?

$$\hat{\beta}_0 = 52.689, \quad \hat{\beta}_1 = 9.662$$

4. State the regression line to predict Exam Score with GPA.

$$\text{Mod} = \ln(Y \times X)$$

5. Would you use this line to predict an achievement score based on a GPA of 3.5? If yes, compute the estimate. If not, explain why.

Yes, since it's a good predictor.

Questions from Part 2

1. Based on the scatterplot, does the relationship between X and Y appear linear?

Yes, it appears to be very linear

2. What is the correlation coefficient?

$$0.9959896$$

3. What is the equation of the least squares line?

$$y_i = \hat{\beta}_0 + \hat{\beta}_1 x_i + \varepsilon_i$$

$$\hat{\beta}_0 = \bar{y} - \hat{\beta}_1 \bar{x}$$

4. Does the plot of residuals versus fitted values suggest that the data is linear or not?

It does seem to suggest linear relationship.

5. Does the probability plot suggest that the residuals are normally distributed? Explain.

Yes, since the prob. plot looks like a straight line.

Questions from Part 3

1. In the model that uses WT to predict MPG, what is the p-value and R^2 for the test $H_0 : \beta_1 = 0$? Do you believe that weight is a reasonable predictor for miles per gallon? Explain.

$$P\text{-val} : 8.889e-15 , R^2 = 0.8155$$

Yes, weight is a reasonable predictor for MPG

2. In the model that uses HP to predict MPG, what is the p-value and R^2 for the test $H_0 : \beta_1 = 0$? Do you believe that horsepower is a reasonable predictor for miles per gallon? Explain.

$$P\text{-val} : 1.12e-12 , R^2 = 0.7591$$

Yes, it's a reasonable predictor

3. In the model that uses both WT and HP to predict MPG, what are the p-values and R^2 for the tests $H_0 : \beta_i = 0, i = 1, 2$? Do you believe that both weight and horsepower are reasonable predictors for miles per gallon? Explain.

$$P\text{-val} : 4.554e-14 \quad R^2 = 0.8272$$

Yes they are both reasonable predictors

4. Of the three models you created, which has the highest coefficient of determination?

In model that uses both WT and HP

5. What is your preferred model for predicting miles per gallon? Explain.

Both predictors is my method since it has the highest R^2 and offers a wholistic relationship of MPG.