Practice Assignment: Fisher's Exact Test

1) Two different cough medications claim to be effective within 12 hours of ingestion. A random sample of individuals who have reported having dry coughs for the last 24 hours are observed. Some of them receive 100 milliliters (mL) of medication, some receive 200 mL of medication, and the rest do not receive any medication. After 12 hours, the participants are asked, “Has your cough subsided at all?” The data are in the following table.

	Medication - 100mL	**Medication - 200mL**	**No medication**
Yes, cough has subsided	5	7	2
No, cough has not subsided	3	2	9

Part A: Should the chi-square test for independence be used to identify an association between the treatment a person receives and whether their cough has subsided? Explain.

Part B: To apply Fisher’s Exact Test, what must first be done to the contingency table?

a) The cells must be changed into a 3×3 contingency table.

b) The cells must be combined into a 2×2 contingency table.

c) Fisher’s Exact Test cannot be used.

d) Fisher’s Exact Test can be used on this contingency table as it is.

Part C: Fill in the missing values in the following table, using the labels as a guide.

	Medication	**No medication**
Yes, cough has subsided		
No, cough has not subsided		

Part D: We want to determine at the 5% significance level whether a person's cough subsiding and taking medication are associated with one another. Verify that the conditions for Fisher's Exact Test have been met.

Part E: What is the null hypothesis?

Part F: What is the alternative hypothesis?

Part G: Go to the DCMP *Fisher's Exact Test* tool at https://lumen-learning.shinyapps.io/fisherexact/ and fill in the contingency table based on the answers to Part C.

What is the resulting test statistic?

Part H: What is the P-value?

Part I: At the 5% significance level, can the null hypothesis be rejected?

Part J: Write the conclusion in a sentence.

2) Medicare is federal health insurance that is typically provided for people over the age of 65. An analyst wants to determine if there is a relationship between whether a person has an annual physical and whether the person is of age to be eligible for Medicare. He obtains a simple random sample of people as follows:

	35–44	**45–54**	**55–64**	**65–74**	**75–84**
Has an annual physical	4	7	10	15	20
Does not have an annual physical	11	13	8	6	2

Part A: Combine the table into the following 2×2 contingency table that will help the analyst to determine if there is a relationship between whether a person has an annual physical and whether the person is of age to be eligible for Medicare. Fill in the values, using the labels as a guide.

	35–64	**65–84**
Has an annual physical		
Does not have an annual physical		

Part B: Verify that the conditions for the chi-square test for independence have been met. (Make sure you find the expected frequencies!)

Part C: At the 1% significance level, the researcher wants to know if there is a relationship between the variables. What are the null and alternative hypotheses?

Part D: Go to the DCMP *Chi-Square Test* tool at https://lumen-learning.shinyapps.io/chisquaredtest/ and determine the test statistic and P-value for the test.

Part E: Is the null hypothesis rejected? Using a complete sentence, write your conclusion in context.

