**4.1: Contingency Tables and Probability**

Group Activity

Cholera Inoculation Study, 1894-96:

A group of 818 people who were exposed to cholera in Calcutta, India in 1894-6 were studied. Of this group, 279 were inoculated with Haffkine's anti-cholera vaccine, while the remaining 539 had not been inoculated. Overall, 69 people developed cholera. Three of those who were vaccinated developed cholera. Use this information to complete the Venn diagram and the contingency table. (Source: https://mysite.du.edu/~jcalvert/econ/twobytwo.htm)
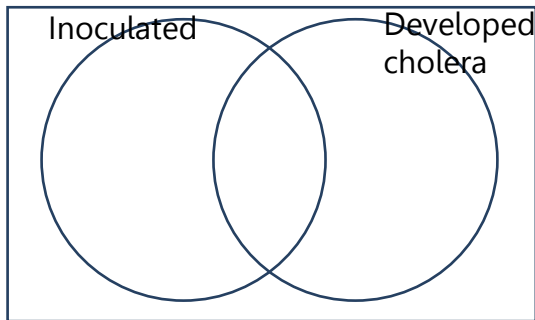
	Developed cholera	Did not develop cholera	Total
Inoculated			
Not inoculated			
Total			

1. Find the marginal, "and," and "or" probabilities. If a randomly selected person from the study was chosen, what is the probability they:

MARGINAL
        a. were inoculated?   b. developed cholera?

AND
        c. were inoculated and developed   d. were not inoculated and did not develop
        cholera?   cholera?

OR
        e. were inoculated or did not   f. were not inoculated or developed
        develop cholera?   cholera?

CONDITIONAL
        g. Given that a person was   h. If a person was not inoculated, what is
        inoculated, what is the probability   the probability they developed cholera?
        they developed cholera?

        i. Do you think the vaccine was effective? Why or why not?

Our Class Data:

The survey data below is from four classes of Math 105 students. Their gender identities and modes of transportation to PCC are summarized in a contingency table.

	Bike	Bus	Drive Self	Ride with Another	Walk	Total
Female	0	12	25	5	3	45
Non-binary or Genderqueer	0	3	2	0	0	5
Male	1	4	16	3	1	25
Total	1	19	43	8	4	75

2. Find the following marginal, "and", and "or" probabilities.

If we were to randomly select a student who took the survey, what is the probability they:

      a. identify as female?

      b. identify as non-binary or genderqueer?

      c. walk to PCC?

      d. bus to PCC?

      e. walk and identify as male?

      f. identify as non-binary or genderqueer and drives them self to PCC?

      g. identify as female or ride with another?

      h. identify as male or walk to PCC?

3. Calculate these conditional probabilities:

a. Given that a student from the survey identifies as female, what is the probability they take the bus to PCC?

b. If a student drives them self to campus, what is the probability they identify as non-binary or genderqueer?

c. What is the probability that a student walks, given they identify as male?

d. Of those students who identify as female, what is the probability they ride to campus with another?