1. This refers to the schoolkid picture which is numbered by each student.
2. (**Instructor** make a copy of this and remove data. Also hide the tables and questions below until students spend some time arguing about which student is smiling,etc. Then after they are done, have a discussion about a consensus for each schoolkid.)
   Instructions for students: First use a google spreadsheet to record for each student (or teacher) the values for following 3 different categorical variables
   i. Are they smiling, not smiling, or we can't tell?
   ii. Is their hair parted on the left, on the right, in the middle, or otherwise or can't tell? Here we are using our left and right and the "otherwise or can't tell" are lumped together.
   iii. Are they male or female?

Hide the part below

Next share the original spreadsheet and the following

Note that in our last in-person class it somehow got a bit disarrayed, so I redid it. This was an interesting exercise, as individual judgments in assigning values to the variables would differ. In class we came to a consensus on these. There are other ways, such

Here are tables summarizing the data:

Smiling/gender	f	m	Sum
c	3	6	9
n	4	6	10
y	12	6	18
Sum	19	18	37

Smiling/hair part	c	l	m	r	Sum
c	1	2	2	4	9
n	5	1	1	3	10
y	7	3	0	8	18
Sum	13	6	3	15	37

gender/hair part	c	l	m	r	Sum
f	4	4	0	11	19
m	9	2	3	4	18
Sum	13	6	3	15	37

3. What is the probability someone has their hair parted on the left or in the middle?
4. What is the probability someone is smiling or we can't tell?

5. What is the probability someone is smiling or female? (The or is inclusive meaning it could be both.) How does this problem differ from the previous one?
6. What is the probability someone is not smiling and they are male. Are being male and not smiling independent?

Next make Venn diagrams for the following combinations and answer the following probability questions. Put numbers in the appropriate places in the Venn diagram.

6.

A: smiling

B: hair parted on the left

a.What is the probability someone is smiling or their hair is parted on the left?

b.What is the probability they are smiling given their hair is parted on the left?

c. What is the probability their hair is parted on the left given they are smiling?

7.

A: female

B: hair is parted on the right or in the middle

a.What is the probability someone is female or their hair is parted on the right or in the middle?

b.What is the probability someone is female given their hair is parted on the right or in the middle?

c. Are A and B independent?

8. Roll two dice.

a.What is the probability the first is even and the second is odd?

b.What is the probability the second is odd given the first is odd?

c.What is the probability the sum is seven given the first is odd?

9. Suppose at a certain hospital the probability a patient in the ER is there because of a minor accident is 0.40, the probability they have to wait more than two hours to be put in a room is 0.5

and the probability they are there because of a minor accident and wait more than two hours for a room is 0.25.

a. Draw a Venn diagram to represent this situation.
b. What is the probability a patient at the ER waits more than two hours for a room and has not been in an accident?
c. What is the probability a patient at the ER waits more than two hours or has been in an accident?
d. What is the probability a patient at the ER waits more than two hours given they have been in an accident?
e. For a patient at the ER, are waiting more than two hours for a room an having been in an accident independent? Explain.