**MA 207 Probability Names:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. In a collection of 200 different baby dolls available for purchase in 2023, a total of 90 had light eyes (E) while 110 had dark eyes (EC). In addition, 120 had light hair (H) while 80 had dark hair (HC). A total of 60 had both light eyes and light hair. A baby doll from the collection is picked at random.
   1. Find P(E). 90/200 = .45 **Make a Venn Diagram to do these easily**
   2. Find P(H). 120/200 = .60
   3. Find P(EH). 60/200 = .30
   4. Find P(E)P(H). .6\*.45 = .27
   5. True or false: P(EH) = P(E)P(H). False
   6. Are E and H independent? No, e. would need to be true.
   7. Find P(E U H). P(E) + P(H) – P(EH) = .45 + .6 - .3 = .75
   8. Find P(ECH). 60/200 = .3
2. In a certain city, seatbelt use is at 90%. Assume a police officer stops three cars at random, and each stop is independent of the others.
   1. Find the probability that the police officer issues no tickets for failure to wear seatbelts.

(.9)3

* 1. Find the probability that the police officer issues at least one seatbelt ticket.

1 – (.9)3

* 1. Find the probability that the police officer issues exactly one seatbelt ticket.

(.1)(.9)(.9) + (.9)(.1)(.9) + (.9)(.9)(.1) = 3(.1)(.9)2

1. You flip 10 coins.
   1. What is the probability that you get no heads?

(½)10

* 1. What is the probability that you get at least one heads?

1 - (½)10

* 1. What is the probability that you get all heads?

(½)10

* 1. What is the probability that you get exactly one heads?

10 (½)10 <= the ten gives the position of the 1 heads, like in 2 part c.

* 1. What is the probability that you get at most one heads?

11 (½)10 <= add up part c and part d

* 1. What is the probability that you get all heads or all tails?

2 (½)10

* 1. What is the probability that you get at least one heads or at least one tails?

1 <= All outcomes in the sample space have this property

* 1. Challenge: what is the probability that you get exactly four heads?

This is indeed a challenge! The answer is 210 (½)10. The 210 is the number of ways of writing 4 H and 6 T in a row. (e.g. T H H T T T H T H T).