MA 110 WORKSHEET (8.2) “EXTRA WORKSHEET 1”

Name ______________________________

1. A bag contains 40 marbles. Seven marbles are purple, eleven are pink, and twenty-two are green.

   A. A marble is selected at random, what is the probability that it is purple?

   B. Two marbles are selected one after the other without replacement, what is the probability that they are both purple?

   C. Four marbles are selected at random one after the other without replacement, what is the probability that they are all purple?

   D. Recall there are 40 marbles in all, how many ways could a combination of 4 marbles be selected?

   E. There are seven purple marbles, how many ways could a combination of 4 purple marbles be selected?

   F. From the application of the formula \( C_{n,r} = \frac{n!}{(n-r)!r!} \),

      \[
      C_{7,4} = \frac{7!}{7-4} \frac{4!}{4!} = \frac{7!}{3!} \frac{4!}{4!} = \frac{7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}{3 \times 2 \times 1} = \frac{7 \times 6 \times 5 \times 4}{2 \times 1}
      \]

      and \( C_{40,4} = \frac{40!}{40-4} \frac{4!}{4!} = \frac{40!}{36!} \frac{4!}{4!} = \frac{40 \times 39 \times 38 \times 37 \times 36!}{36!} = \frac{40 \times 39 \times 38 \times 37}{4 \times 3 \times 2 \times 1} \)

      Thus, \( \frac{C_{7,4}}{C_{40,4}} = \frac{\frac{7 \times 6 \times 5 \times 4}{2 \times 1}}{\frac{40 \times 39 \times 38 \times 37}{4 \times 3 \times 2 \times 1}} = \frac{7 \times 6 \times 5 \times 4}{40 \times 39 \times 38 \times 37} \cdot \frac{4 \times 3 \times 2 \times 1}{4 \times 3 \times 2 \times 1} = \frac{7 \times 6 \times 5 \times 4}{40 \times 39 \times 38 \times 37} \)
G. If seven marbles are selected at random one after the other without replacement, what is the probability that they are all purple?

H. If ten marbles are selected at random one after the other without replacement, what is the probability that three are purple and seven are green?

I. Three marbles are selected one after the other without replacement, what is the probability that they are all purple?

J. Three marbles are selected one after the other without replacement, what is the probability that exactly two are purple?

K. Three marbles are selected one after the other without replacement, what is the probability that at least two are purple?
2. A small college has 30 faculty members, eight from business, six from education, nine from science, and seven from math. From this group of faculty, a committee of three people will be chosen at random. What is the probability that this committee will contain

A. only faculty from science?

B. no people from education?

C. Suppose a larger committee of ten faculty is chosen. What is the probability that five are from education and five are from math?

3. A bag contains 40 marbles. Seven marbles are purple, eleven are pink, and twenty-two are green.

A. A marble is selected at random, what is the probability that it is green?

B. Two marbles are selected one after the other with replacement, what is the probability that they are both green?

C. Ten marbles are selected one after the other with replacement, what is the probability that they are all green?

D. Ten marbles are selected one after the other with replacement, what is the probability that seven are green?