ECO-104 (Section 4)   Available: Oct 19th, 1:00 pm
East West University   PROBLEM SET - 1   Due: Oct 26th, 10:00 am (before class)

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1. An experiment has 3 steps. There are 3 possible outcomes for the first step, 2 for the second, and 4 for the third. How many experimental outcomes exist for the entire experiment?

2. Suppose we have 6 letters, A, B, C, D, E, and F. How many ways we can select 3 letters from the group of 6 letters? How many ways we can order/arrange 3 letters from the group of 6 letters?

3. If 5 balls are thrown at random into 5 boxes, assuming one ball cannot be thrown to more than a single box, how many ways the 5 balls can be thrown to 5 boxes? If now we have 10 boxes how many ways the 5 balls can be thrown to 10 boxes?

4. How many ways can 5 children be lined up? Suppose that we have 10 children, 5 are to be chosen and lined up. How many different lines are possible?

5. Consider the experiment of tossing a coin 3 times. Develop a tree diagram for the experiment. List the experimental outcomes. What is the probability for each experimental outcome (assuming all outcomes are equally likely)?

6. Suppose for an experiment we have the sample space $\Omega = \{\omega_1, \omega_2, \omega_3\}$.

   - If we assume all outcomes are equally likely, then calculate $P(\{\omega_1\})$, $P(\{\omega_2\})$ and $P(\{\omega_3\})$ and $P(\{\omega_1, \omega_2\})$.

   - Now suppose we perform this experiment under identical conditions 50 times, where ω_1 occurred 20 times, ω_2 occurred 13 times, and ω_3 occurred 17 times. Calculate $P(\{\omega_1\})$, $P(\{\omega_2\})$ and $P(\{\omega_3\})$, $P(\{\omega_1, \omega_2\})$ using the frequency definition of the probability.

7. If 4 dice are rolled, what is the probability that the 4 numbers will be different? If 6 dice are rolled, then what is the probability that the 6 numbers will be different?

8. An elevator in a building starts with 5 passengers and stops at 7 floors. If every passenger has a possibility to get off at each floor and all the passengers leave independently of each other, what is the probability of the event that no two passengers will leave at the same floor?

9. Suppose that we have a sample space with five equally likely experimental outcomes $\Omega = \{\omega_1, \omega_2, \omega_3, \omega_4, \omega_5\}$. Let

$$A = \{\omega_1, \omega_2\}$$
$$B = \{\omega_3, \omega_4\}$$
$$C = \{\omega_2, \omega_3, \omega_5\}$$

   - a. Find $P(A), P(B)$, and $P(C)$.

   - b. Find $P(A \cup B)$. Are A and B mutually exclusive?

   - c. Find $A^c, C^c, P(A^c)$, and $P(C^c)$.

   - d. Find $A \cup B^c$ and $P(A \cup B^c)$.

   - e. Find $P(B \cup C)$.