Problem 1:

    (a) The chairs of an auditorium are to be labeled with an uppercase English letter followed by a positive integer not exceeding 100. What is the largest number of chairs that can be labeled differently?

    (b) A student can choose a computer project from one of three lists. The three lists contain 23, 15, and 19 possible projects, respectively. No project is on more than one list. How many possible projects are there to choose from?

Problem 2: Suppose that there are eight runners in a race. The winner receives a gold medal, the second-place finisher receives a silver medal, and the third-place finisher receives a bronze medal. How many different ways are there to award these medals, if all possible outcomes of the race can occur and there are no ties?

Problem 3: How many poker hands of five cards can be dealt from a standard deck of 52 cards?

Problem 4:   Let A and B be two events in a sample space for which $P(A) = 2/3$, $P(B) = 1/6$, and $P(A \cap B) = 1/9$. What is $P(A \cup B)$?

Problem 5:   Let A and B be two events in a sample space S for which one knows that the probability that at least one of them occurs is $3/4$. What is the probability that neither A nor B occurs?

Problem 6:   If two events, A and B, are such that $P(A) = 0.5$, $P(B) = 0.3$, and $P(A \cap B) = 0.1$ find the following:

(a) $P(A|B)$

(b) $P(B|A)$

(c) $P(A|A \cap B)$

Problem 7: A survey of consumers in a particular community showed that 10% were dissatisfied with plumbing jobs done in their homes. Half the complaints dealt with plumber A, who does 40% of the plumbing jobs in the town.

    (a) Identify an appropriate sample space S and probability measure for this scenario.

    (b) Find the probability that a consumer will obtain an unsatisfactory plumbing job, given that the plumber was A.

    (c) Find the probability that a consumer will obtain a satisfactory plumbing job, given that the plumber was A.

Problem 8: A fair die is rolled twice. A is the event that the total sum of the rolls equals 4, while B is the event that at least one of the rolls is a 3. Are A and B independent events?

Problem 9: Suppose that there is a 1 in 50 chance of injury on a single skydiving attempt. Suppose that an individual makes 50 dives.

    (a) Identify an appropriate sample space S for this scenario.

    (b) Assume that the outcome of any one of the dives is independent of the others. A friend claims there is a 100% chance of injury if the skydiver jumps 50 times. Is your friend correct? Why or why not?

Problem 10:   A ball is drawn at random from an urn containing one red and one white ball. If the white ball is drawn, it is put back into the urn. If the red ball is drawn, it is returned to the urn together with two more red balls. Then a second draw is made. What is the probability a red ball was drawn on both the first and the second draws?

Problem 11:   Suppose that a test has been devised to detect a certain disease. Suppose that:
   • The disease affects 0.1% of the population.
   • The test does not produce any false negatives.
   • The test produces false positives at a rate of 5%.

Given that a randomly selected individual tests positive for the disease, what is the probability that they have it?