

I. Probability and the Counting Principle. Show all steps and work. Round probabilities to four decimal places.

(a) How many different license plates can be made if each plate consist of 1 digit, followed by 3 letters (omitting the letter 'O'), followed by 2 more digits?

(c) Draw a tree diagram and list the sample space for the following situation: one coin toss, followed by the roll of a die, followed by another coin toss.

(d) The password for an account only uses the letters O, M, and G.

- If the password is two letters long, how many different passwords are there?
- What is the probability of guessing a 2-letter password?
- How long should the PIN be if you want the probability of guessing the PIN to be less than 0.0001?

(b) A math test has 10 questions, each with 5 possible answers. How many different ways can all 10 questions on the test be answered?

II. Permutations and Combinations. Simplify and reduce any expressions with factorials or fractions BEFORE using your calculator to multiply. Show all steps!! Round probabilities to four decimal places.

(a) In how many ways can a president, vice-president, and treasurer be chosen from a group of 12 candidates?

(c) A lunch menu offers 7 different salads and 5 entrees. In how many different ways can 3 salads and 2 entrees be chosen?

(e) A bag contains 6 red and 6 green gummy bears. Find the probability of selecting 3 red and 5 green gummy bears.

(b) How many ways can you arrange the letters in the word **MASSACHUSETTS**?

(d) Evaluate the following: $\frac{{}^7C_3}{{}^8P_2}$

Answers

I. (a) 15,625,000

(b) 9,765,625

(c) 24 possibilities

(d) (i) 9 (ii) $\frac{1}{9}$ (iii) at least 9 digits

II. (a) 1,320

(b) 64,864,800

(c) 350

(d) $\frac{5}{8}$

(e) $P(3 \text{ red and } 5 \text{ green}) \approx 0.2424$