

MATHEMATICS 360-255-LW

Quantitative Methods II

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I – Basic Probability

- Find the sample space S along with $n(S)$.
 - The face cards are removed from a regular deck and then 1 card is selected from this set of 12 face cards.
 - A box contains three marbles of different colors, blue, red and green. Two balls are drawn at random (without replacement).
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 - Two dice are rolled, and the sum of their dots is observed.
 - Two dice are rolled, and the product of their dots is observed.
 - Three coins are tossed and the outcome is recorded.
- A single die is rolled. Find the probability the number on top is:
 - a 3.
 - an odd number.
 - a number less than 5.
 - a number no more than 3.
- Two dice are rolled, where one is black and the other is white. Find the following probabilities.
 - $P(\text{white die is an odd number})$
 - $P(\text{sum is } 6)$
 - $P(\text{both dice show odd numbers})$
 - $P(\text{number on black die is larger than number on white die})$
- A hat contains 40 marbles. Of them, 16 are red and 24 are green. If one marble is randomly selected out of this hat, what is the probability that this marble is
 - red?
 - green?
- The odds of being accepted in Psychology at McGill University are 3 to 8. Find the probability of being accepted.
- A box contains 3 marbles, a red, a blue and a green marble. In two marbles are picked at random, what is the probability that
 - one is red and the other is green?
 - both are red?
- A card is drawn from a standard deck of 52 cards. Find the following probabilities.
 - $P(\text{King})$
 - $P(\text{club})$
 - $P(\text{black card})$
 - $P(\text{Face card})$

8. A group of 150 randomly selected CEOs was tested for personality type. The following table gives the results of this survey.

	Type A	Type B
Men	78	42
Women	19	11

If one CEO is selected at random from this group, find the probability that this CEO

- has a type A personality
 - is a women
 - is a women with a type A personality
9. The academic adviser of a college informs us that in his college of 4000 students, 1500 students are currently enrolled in a psychology class and 550 in a statistics class. If 220 students are in a psychology and a statistics class, find the probability that if a student is selected at random, he will be in:
- only a psychology class
 - only a statistics class
 - a least one of the two classes.
10. The newsletter of a College announced that 175 students are in a math or poetry club. If the math club has 92 members, with 35 also in the poetry club, what is the probability that if a student is picked at random
- he will be in the math club only.
 - he will be in the poetry club only.
 - he will be in both clubs.
11. A group of 90 freshman psychology students at a large university was surveyed with the following results.
- 19 of the students read Psychology Today
 - 18 read Journal of Behavioral Sciences
 - 50 read Psychotherapy Magazine
 - 13 read Psychology Today and Journal of Behavioral Sciences
 - 11 read Journal of Behavioral Sciences and Psychotherapy Magazine
 - 13 read Psychology Today and Psychotherapy Magazine
 - 9 read all three
- Using this data, determine the probability that if a student is chosen at random, he will read
- none of the publications?
 - Psychotherapy Magazine only?
 - How many read Psychology Today and Journal of Behavioral Sciences, but not Psychotherapy Magazine?
12. A survey on a group of 100 College students showed that 8 of them have a motorcycle, 20 have a car, 48 have a bicycle and 38 have neither a motorcycle, a car or a bicycle. No one has at the same time a motorcycle and a car. What is the probability that a student chosen at random has a bicycle and either a car or a motorcycle?

ANSWERS

1. a) $S = \{J\clubsuit, J\diamondsuit, J\heartsuit, J\spadesuit, Q\clubsuit, Q\diamondsuit, Q\heartsuit, Q\spadesuit, K\clubsuit, K\diamondsuit, K\heartsuit, K\spadesuit\}$ $n(S) = 12$
 b) $S = \{BR, BG, RB, RG, GB, GR\}$ $n(S) = 6$
 c) $S = \{BB, BR, BG, RB, RR, RG, GB, GR, GG\}$ $n(S) = 9$
 d) $S = \{2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$ $n(S) = 11$
 e) $S = \{1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 15, 16, 18, 20, 24, 25, 30, 36\}$ $n(S) = 18$
 f) $S = \{HHH, HHT, HTH, HTT, THH, THT, TTH, TTT\}$ $n(S) = 8$
2. a) $\frac{1}{6}$ b) $\frac{1}{2}$ c) $\frac{2}{3}$ d) $\frac{1}{2}$
3. a) $\frac{1}{2}$ b) $\frac{5}{36}$ c) $\frac{1}{4}$ d) $\frac{5}{12}$
4. a) $\frac{2}{5}$ b) $\frac{3}{5}$
5. $\frac{3}{11}$
6. a) $\frac{1}{3}$ b) 0
7. a) $\frac{1}{13}$ b) $\frac{1}{4}$ c) $\frac{1}{2}$ d) $\frac{3}{13}$
8. a) $\frac{97}{150}$ b) $\frac{1}{5}$ c) $\frac{19}{150}$
9. a) $\frac{8}{25}$ b) $\frac{33}{400}$ c) $\frac{183}{400}$
10. a) $\frac{57}{175}$ b) $\frac{83}{175}$ c) $\frac{1}{5}$
11. a) $\frac{31}{90}$ b) $\frac{7}{18}$ c) $\frac{2}{45}$
12. $\frac{7}{50}$