

MDM4U – Unit 3 - Probability and Odds Assessment

1. Given a standard 52 card deck,
 - a) What is the probability that you draw a red seven? [2]
 - b) What are the odds in favour of drawing a black face card? [3]

2. Two dice are thrown. What is the probability of,
 - a) A double (2 of the same dice). [2]
 - b) A pair (2 the same) or a sum of 8 [3]

3. Five students are randomly selected from seven boys and six girls to join a ski trip. What is the probability that:
 - a) All are girls? [2]
 - b) There are more boys than girls, but at least 1 of each? [3]

4. In a bag of marbles, there are 5 red marbles, 7 blue marbles and 10 yellow marbles. Three marbles are pulled out, one at a time, and set in a row on the carpet. What is the probability that you pull, in order, a blue then a yellow and then a red marble? [3]

5. A used car lot is organizing 5 different coloured cars in a row by the road to draw people into the store. What is the probability that the red car and the orange car are on the two ends of the row to make the display more appealing? [3]

6. Determine the odds in favour of flipping three coins and having them all turn up heads. [3]

7. At an international software conference held in England, a survey was conducted of the 75 delegates who attended regarding their health, it was discovered that the number of people with a:

- Headache is 32
- Sore back is 23
- Stiff neck is 24
- Headache and sore back is 9
- Headache and stiff neck is 7
- Sore back and stiff neck is 5
- All three ailments is 2

a) Organize the information into a Venn diagram. [4]

b) What is the probability that a delegate is healthy (none of the ailments listed)? [2]

c) What is the probability that a delegate has a stiff neck or a headache or both, (but their back is fine)? [2]

d) What are the odds that a randomly selected delegate has only a headache? [3]

8. Sam estimates the probability of getting the next question correct if the previous one was correct on a finite math test is $\frac{4}{5}$. But the probability of getting the next question correct if the previous one was wrong is $\frac{2}{5}$. The probability of her getting the first question correct is $\frac{3}{4}$. Calculate the conditional probability the first question is incorrect and that the second question is incorrect. Include a fully labeled tree diagram. What is the probability that they get both a question and the next question both incorrect. [5]

9. Suppose you are rolling two dice, what are the odds that you will roll a total between 8 to 10 inclusive? [3]

10. Enzyme immunoassay (EIA) tests are used to screen blood specimens for the presence of antibodies to HIV, the virus that causes AIDS. Antibodies indicate the presence of the virus. The test is quite accurate, but not always correct. If a person carries the antibodies, there is a 0.9985 chance of testing positive. If a person does not carry the antibodies, there is a 0.0060 chance of testing positive. Suppose that 1% of a large population carries antibodies to HIV in their blood.

Let I be infected and T be positive test.

- a) Draw a tree diagram for selecting a person from this population. [3]
- b) What is the probability that a randomly selected person is Infected AND Tests positive? [2]
- c) What does $P(T | \bar{I})$ equal? [1]
- d) Calculate the probability that a randomly selected person will test positive? [2]

11. Suppose the odds of the Toronto Maple Leafs winning the Stanley Cup are 2:5, while the odds that the Montreal Canadiens win are 2:11. What are the odds in favour of either Toronto or Montreal winning the Stanley Cup? [5]