Probability Exercises

1. A box has 3 green marbles and 2 red marbles. Calculate the following probabilities:

   a) Drawing a green marble.

   b) Drawing a red marble.

   c) Drawing a two red marbles in a row (with replacement).

   d) Drawing a two red marbles in a row (without replacement).

   e) Drawing a two green marbles in a row (with replacement).

   f) Drawing a two green marbles in a row (without replacement).

   g) Drawing a two green marbles out of the first three (with replacement).

   h) Drawing a two green marbles out of the first three (without replacement).

   i) Drawing a three green marbles in a row (with replacement).

   j) Drawing a three green marbles in a row (without replacement).

   k) Drawing a three red marbles in a row (with replacement).

   ℓ) Drawing a three red marbles in a row (without replacement).

2. Cards are drawn at random from a well-shuffled deck. Calculate the following probabilities.

   a) First card is J♡

   b) Second card is K♠

   c) Second card is K♠ given that the first was J♡

   d) First two cards are J♡ followed by K♠

   e) First two cards are J♡ and K♠ (either order)

   f) First two cards are a ♡ followed by a 10

   g) First five cards are four 10s followed by a ♣

3. Two fair dice are tossed. Calculate the following probabilities

a) Sum is even given that it is less than 3

b) Sum is even and less than 3

c) One die shows a 4

3. **Sum Rule**.

a) Cards are drawn at random from a well-shuffled deck. Calculate the following probabilities.

i) First card is 10♡ or K

ii) First card is ♡ or K

iii) First card is an ♡ or ♢

iv) First card is not a ♡ or is ♢

v) First two cards are both ♡ or both 10

b) Two dice are rolled. Calculate the following probabilities.

i) Sum is three or four

ii) Sum is three or odd

iii) Sum is three or four or odd

4. **Independent / Mutually Exclusive Events**. For each event A described below, describe events B for which A and B are i) independent, ii) dependent, iii) mutually exclusive, iv) not mutually exlusive.

a) The first of two dice will show an even number of dots

b) The first card drawn from a deck will be a ♣

c) The second card drawn from a deck will be a ♡