**ECOM90024**

**Forecasting in Economics and Business**

**Tutorial 1 Questions**

1. Let be a uniform random variable, defined on the interval [-2,2].
   1. Let . Provide a visual depiction of and write down its probability density function.

**is simply shifted to the right by 1.**

* 1. What is the correlation coefficient of and Provide your reasoning.

**is simply a linear transformation of . Therefore the correlation coefficient must be 1.**

1. Consider an experiment in which two dice are rolled. One die is a fair six sided die with faces while the other is a fair four sided die with faces
   1. What is the sample space of the experiment?

**The outcomes of this random experiment are the pairs:**

* 1. What is the probability distribution of the set of outcomes of this experiment?

**The probability distribution is the complete set of joint probabilities which are computed as the product of the marginal probabilities of each dice roll. The thing to recognize here is that each individual dice roll is independent of the other.**

* 1. Suppose that a trial of this experiment takes place. Is the resulting face of the fair six sided die an independent event from the resulting face of the fair four sided die? Explain your reasoning.

**We can always verify whether two events are independent from one another by checking one of the two equivalent relations:**

**1. The joint probability is simply the product of the marginals**

**2. The conditional probability is equal to the marginal**

**In this case it should be clear that we are dealing with independent events. The outcome of the roll of one die has no impact on the outcome of the other.**

* 1. Let be a random variable that is defined as the sum of the numbers on the resulting faces of both die. What is the probability distribution function of ? Compute the mean and variance of .

**will have the following probability distribution function:**

|  |  |
| --- | --- |
|  |  |
| **2** | **1/24** |
| **3** | **2/24** |
| **4** | **3/24** |
| **5** | **4/24** |
| **6** | **4/24** |
| **7** | **4/24** |
| **8** | **3/24** |
| **9** | **2/24** |
| **10** | **1/24** |

1. Let and be discrete random variables. Show that .

We start with writing out the RHS in its summation form

Then, using the fact that , we may write

According to Bayes’ law we know that

Therefore,

Rearrangement yields

Since we obtain our desired result

1. See code in tutorial1.R