Software Development Principles for Statistical Modelling
Principles of Probability with Python/R

Mick Cooney
mickcooney@gmail.com

January 30, 2017

`https://www.github.com/kaybenleroll/training_courses`.

Code is available in the `sdpsm_intro` directory.

Content in this workshop is based on the 'Software Carpentry' course: `http://software-carpentry.org/`

1. Introduction

2. Introduction to Probability

Exercise 2.1 Generate 100 random uniform numbers between 0 and 1.

Exercise 2.2 Generate 100 random numbers distributed as a normal distribution with mean 0 and standard deviation 1.

Exercise 2.3 Generate 100 normally distributed numbers with mean 50 and standard deviation 10.

Exercise 2.4 Transform the standard normal numbers from the previous question and convert it to a distribution with mean 50, sd 10 and compare to the data generated directly.

Exercise 2.5

3. Principles of Probability

Exercise 3.1 Using simulation, calculate the value of π. Estimate the error in your calculated value.

Exercise 3.2 Starting with a sample size of 10 and scaling in whatever way you wish, illustrate the *Law of Large Numbers* by plotting the mean of the $(0, 1)$ uniform distribution of data by sample size.

Exercise 3.3 Repeat the above exercise with the standard normal distribution.

Exercise 3.4 Repeat for the Cauchy distribution.

Exercise 3.5 Using the above distributions, illustrate the `Central Limit Theorem`.

4. Exercises in Probability

Exercise 4.1