

## 12 Descriptive Statistics

### 12.1

For the following types of data, say whether they are nominal, ordinal, or numeric, and give the most appropriate measure of central tendency to use to describe such data

1. Duration of daily commute
2. Frequency in Hz
3. DEFCON level<sup>1</sup>
4. Brands of espresso maker

### 12.2

For the following data calculate the median and mode(s). Use Tukey's Fences with a value of  $k = 1.5$  to exclude outliers before calculating the mean.

1. 4, 2, 5, 2, 34, 2, 4
2. 1, 4, 6, 2, 4, 3, 1

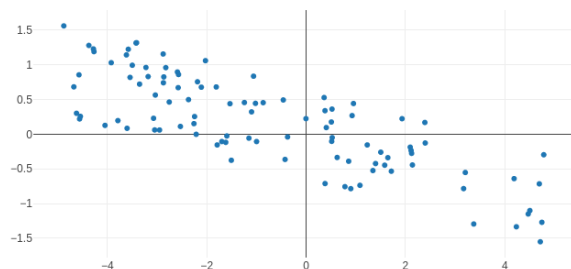
### 12.3

The following data represents a sample of scores collected from two levels of a mobile game. For each, calculate the range, inter-quartile range, and an appropriate form of standard deviation.

1. 1, 9, 3, 9, 23, 5, 3, 6
2. 5, 2, 14, 25, 14, 11, 5

### 12.4

What is the approximate correlation of the data shown? Pick the closest out of  $\{-1, -0.5, 0, 0.5, 1\}$



<sup>1</sup>See <https://en.wikipedia.org/wiki/DEFCON>

### 12.5

8 bytes of data are transmitted over a noisy channel. For every bit transmitted, the probability of the bit being flipped (a transmission error) is  $10^{-2}$ . What is the chance that at least one error occurs?

### 12.6

The time taken to sort an array using Insertion Sort is  $n(n+1)/2$ , where  $n$  is the size of the array. You use Insertion Sort on 100 arrays which are uniformly distributed in length between 1 and 100 elements.

1. What is the total time taken?
2. What is the mean time per array?

### 12.7

You flip an unfair coin 6 times. The probability of heads is 0.2. The number of heads is given by the variable  $X$ .

1. What is  $P(X = 2)$ ?
2. What is the most likely value of  $X$  (mode)?
3. What is  $\sum_{i=0}^6 P(X = i)$ ?

### 12.8

Let  $Y$  be a continuous variable uniformly distributed between 0 and 1.

1. What is  $P(Y = 0.1)$ ?
2. What is  $P(Y > 0.6)$ ?

### 12.9

A variable  $Z$  is defined by a normal distribution where  $\mu = 0$  and  $\sigma = 1$ .

1. What is the median value of  $Z$ ?
2. What is  $P(-2 < Z < 2)$ , approximately?
3. What is the (approximate) probability of generating a value of  $Z$  that is greater than 2?