

Exercises 6

1. Plot a bar chart of profit for each company:

Company	End of Year Profit
Apple	\$12 million
Tesco	\$3 million
Microsoft	\$10 million
Swatch	\$2 million
McDonalds	\$7 million

2. Plot a scatter plot of weight against height:

Height (cm)	131	142	130	127	138	149	131	135	143	145
Weight (kg)	70	74	70	71	78	82	72	75	78	80

Calculate a correlation coefficient between height and weight.

3. Consider the two sets of values below:

$$A = \{33, 35, 40, 34, 46, 22, 37, 25, 34, 32, 32, 18, 35, 40, 48, 41, 16, 25, 42, 26, 36\}$$

$$B = \{21, 32, 34, 30, 30, 29, 25, 31, 28, 29, 31, 37, 38, 27, 31, 30\}$$

- Draw histograms of each distribution.
 - Draw both distributions as boxplots, on the same axis.
 - Draw both distributions as violinplots, on the same axis.
4. It is feared that a lake in Canada is being contaminated by a nearby factory. Eight pH samples are taken with the following results:

$$5.4, 3.3, 5.4, 5.8, 7.4, 6.1, 6.6, 4.0, 3.9$$

Environmentalists need to be 90% confident that the average pH of the lake is more acidic (lower pH) than pure water (with a pH of 7). Perform an appropriate hypothesis test.

5. In order to test the truth of Aesop's fable, a group of philosophy students set up a race between 7 tortoises and 7 hares. The results are:

- 1st - Tortoise
- 2nd - Hare
- 3rd - Tortoise
- 4th - Tortoise
- 5th - Hare
- 6th - Hare
- 7th - Tortoise
- 8th - Tortoise
- 9th - Tortoise
- 10th - Hare
- 11th - Tortoise
- 12th - Hare
- 13th - Hare
- 14th - Hare

Perform a hypothesis test at the 95% confidence level to check whether slow and steady really does win the race.

6. The salaries of a selection of Chemistry graduates from the United Kingdom and from France are shown below:

- UK: £21700, £29450, £20800, £32100, £25550, £27400, £22000, £21250, £26000
- France: €30600, €33630, €31200, €28500, €34600, €31750, €36950

At the time the exchange rate was £1 = €1.21. University administrators want to be 90% confident that French graduates and British graduates earn different mean salaries. Perform an appropriate hypothesis test.

7. The contingency table below shows the number of survivors and fatalities on the Titanic, by class.

	1st	2nd	3rd	Crew
Survived	203	118	178	212
Perished	122	167	528	673

Are class and survival status independent or not? Perform an appropriate hypothesis test at the 90% confidence level.

8. In a study, children are given a score between 0 and 20 that corresponds to reading ability. Ten children are assessed and given an initial score. They are then given an hour session with a reading development specialist, and are assessed once again. The scores are given below:

Child	A	B	C	D	E	F	G	H	I	J
Score 1	10	13	9	18	14	8	6	20	13	10
Score 2	11	16	5	17	20	9	6	15	18	14

The psychologists want to be 95% confident that the session with a reading development specialist has improved the children's reading scores. Perform an appropriate hypothesis test.

9. It is known that the weight of Atlantic salmon caught by the Halifax Hookings Fishing Company off the coast of Nova Scotia is Normally distributed with a mean of 4.9kg and standard deviation of 0.7kg.
- a) What is the probability of hooking a salmon weighing more than 6kg?
 - b) What is the probability of hooking a salmon weighing between 3.8kg and 5.2kg?
 - c) What weight will 90% of salmon hooked be less than?
 - d) What is the inter-quartile range of the salmon hooked?