Warm up Exercise for statistical modelling

Exercise 1:

For a biological study situation below, translate it into Python language and answer the questions relating to correlation between Chrisps/Second and Temperature.

The number of chirps (pulses of sound) per second made by a striped ground cricket was measured at various temperatures. Because crickets are cold-blooded there is reason to believe that temperature affects aspects of their behaviour such as chirp frequency. The data are given in the table below and may be regarded as a random sample from a population of crickets.

Chirps/Second y	Temperature ($\mathrm{^\circ F}$) x
14.4	76.3
14.7	69.7
15.0	79.6
15.4	69.4
15.5	75.2
15.7	71.5
16.0	71.6
16.1	80.5
16.3	83.3
17.0	83.5
17.1	80.6
17.2	82.6
18.4	84.3
19.8	93.3
20.0	88.6

You are given that

$$\Sigma x_i = 1190.0, \ \Sigma y_i = 248.6, \ \Sigma x_i^2 = 95\,098, \ \Sigma y_i^2 = 4161.1, \ \Sigma x_i y_i = 19\,862.6.$$

(a) Formulate the hypothesis testing that the two variables are uncorrelated against they are positively correlated at 1% significant level

(b) Calculate the Spearman's rank correlation coefficient and test for 1% significant level for the hypothesis testing

Reference (question 3): http://www.hkss.org.hk/images/exam/papers/Past/2015/HC4%202015%20-%20%20HKSS.pdf

Exercise 2:

For a social science study situation below, translate it into Python language and answer the questions relating to correlation between number of Bronze and number of Silver won by each country.

The table below shows some data for the nine top-ranked countries in the medal table for the London 2012 Olympic Games according to

http://data.london.gov.uk/datastore/package/alternative-olympics-2012-medal-table (accessed on 15 June 2013).

Country	Rank	Gold	Silver	Bronze
USA	1	46	29	29
China	2	38	27	22
G Britain	3	29	17	19
Russia	4	24	25	33
S Korea	5	13	8	7
Germany	6	11	19	14
France	7	11	11	12
Italy	8	8	9	11
Hungary	9	8	4	5

(a) Formulate the hypothesis testing that the two variables are uncorrelated against they are positively correlated at 2% significant level

(b) Calculate the Spearman's rank correlation coefficient and test for 2% significant level for the hypothesis testing

Reference (question 1): http://www.hkss.org.hk/images/exam/papers/Past/2014/HC4_2014-HKSS.pdf