

Remember to show your thinking through your work.

- 1) The data below were gathered on a random sample of 5 basking sharks, swimming through the water and filter-feeding, i.e. letting the water bring food into their mouths.

Mean speeds for basking sharks

Body Length (meters)	Mean speed (meters/second)
4.0	0.89
4.5	0.83
4.0	0.76
6.5	0.94
5.5	0.94

- a) What is the value of the correlation coefficient for these data?

<type answer here>

- b) Find the equation of the least squares line describing the relationship between x = body length and y = mean speed.

<type answer here>

- c) If these sharks are representative of the population of basking sharks, what would you predict is the mean speed for a filter-feeding basking shark that is 5.0 meters in length? Show any calculations below.

<type answer here>

- d) The largest basking shark in the sample is measured as 6.5 meters long. Theory predicts a maximum length of about 12.26 meters. Would it be reasonable to use the equation from part (b) above to predict the mean filter-feeding speed for a 12 meter long basking shark? Why or why not?

<type answer here>

- 2) One measure of form for a runner is stride rate, defined as the number of steps per second. A runner is considered to be efficient if the stride rate is close to optimum. The stride rate is related to speed; the greater the speed, the greater the stride rate. In a study of 21 top female runners, researchers measured the stride rate for different speeds. The following table gives the average stride rate of these women versus the speed.

(Data is from R.C. Nelson, C.M. Brooks, and N.L. Pike, "Biomechanical comparison of male and female runners", in P. Milvy (ed.), *The Marathon: Physiological, Medical, Epistemiological, and Psychological Studies*, New York Academy of Sciences, 1977, pp. 793-807.

Speed	15.86	16.88	17.50	18.62	19.97	21.06	22.11
Stride Rate	3.05	3.12	3.17	3.25	3.36	3.46	3.55

- a) Plot the data on a scatterplot. Describe any patterns (or lack thereof) in the data.

<type answer here>

- b) Find the equation of the least squares regression line.

<type answer here>

- c) Interpret the slope and intercept of the LSRL in context.

<type answer here>

- d) Make a prediction of the stride rate if the speed is 19 feet per second.

<type answer here>

- 3) The modern Olympic Games are a modified revival of the Greek Olympian Games that came to be largely through the efforts of the French sportsman and educator Baron Pierre de Coubertin. The Games are an international athletic competition that has been held at a different site every four years since their inauguration in 1896, with occasional interruptions in the times of world wars.

The data for the gold medal performances in long jump, high jump, discus throw are given below (in inches). Year is coded to be zero in 1900.

Year	Long Jump	High Jump	Discus Throw
-4	249.75	71.25	1147.5
0	282.875	74.8	1418.9
4	289	71	1546.5
8	294.5	75	1610
12	299.25	76	1780
20	281.5	76.25	1759.25
24	293.125	78	1817.125
28	304.75	76.375	1863
32	300.75	77.625	1948.875
36	317.3125	79.9375	1987.375
48	308	78	2078
52	298	80.32	2166.85
56	308.25	83.25	2218.5
60	319.75	85	2330
64	317.75	85.75	2401.5
68	350.5	88.25	2550.5
72	324.5	87.75	2535
76	328.5	88.5	2657.4
80	336.25	92.75	2624
84	336.25	92.5	2622
88	343.25	93.5	2709.25
92	342.5	92	2563.75

- a) Plot the data for each event on a separate scattergram. Describe the direction, form and strength of the relationship. Does the relationship between year and performance appear to be linear?

<type answer here>

- b) Find the LSRL for each event.

<type answer here>

- c) Predict the Olympic performance for each event for the Athens 2004 games.

<type answer here>

- d) Compare each of your predictions to the actual results in the Athens 2004 games. Be sure to appropriately convert units.

Here are the Athens 2004 Olympic Results

The long jump result in Athens was 338.1883 inches.

The high jump result in Athens was 92.9132 inches

The discus result in Athens was 2751.5693 inches

<type answer here>