

Exercise 1 (7points)

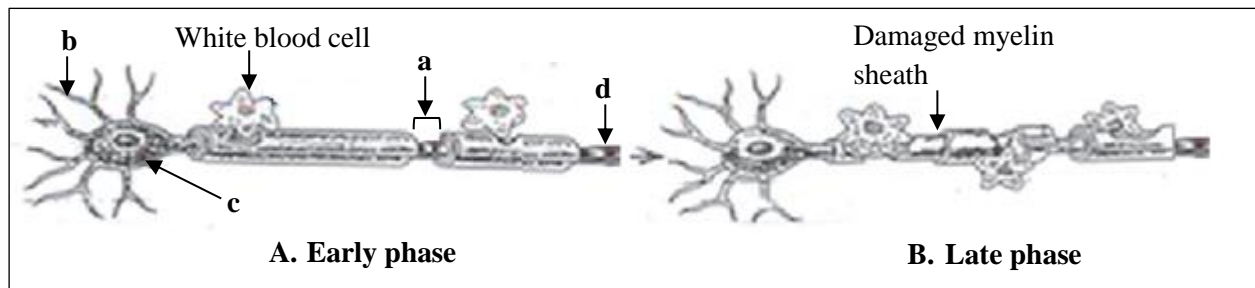
Multiple Sclerosis, a Neurological Disease

Multiple sclerosis is a neurological disease that begins with visual troubles, partial paralysis, clumsiness, or walking problems. This disease is due to a progressive destruction of the myelin sheath by white blood cells.

Document 1

- 1- Pick out from document 1:
1-1- the symptoms of multiple sclerosis.
1-2- the cause of this disease.

Document 2 shows the aspect of a myelinated neuron of an affected individual at the early phase A (beginning of the disease) and at the late phase B.



Document 2

- 2- Label the structures a, b, c and d of document 2.

Document 3 represents the speed of conduction of the nervous message recorded at the level of a myelinated nerve fiber during the two phases mentioned in document 2, as well as in a healthy individual.

	Healthy individual (Control)	Affected individual (Early phase)	Affected individual (Late phase)
Speed of conduction of nerve message (in m/s)	100	70	10

Document 3

- 3- Construct a histogram that shows the results presented in document 3.
4-1- Analyze the obtained results.
4-2- What can you conclude?
5- Name two other neurological diseases.

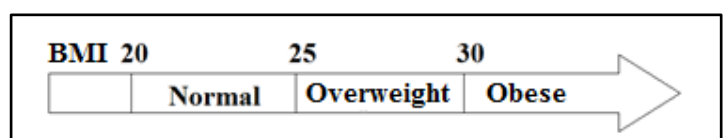
Exercise 2 (6 points)

Obesity

Obesity, a state characterized by an abnormal or excessive accumulation of body fat, can lead to dangerous consequences on health. Three individuals A, B and C consult a dietitian. These persons are of the same age (30 years) and have the same height (1.7m), but they differ in their body masses: A = 70 kg, B = 90 kg and C = 105 kg.

The body mass index (BMI) is used to measure the degree of obesity (document 1). This index is obtained by applying the formula:

$$BMI = \frac{\text{mass (kg)}}{(\text{Height m})^2}$$



Document 1

- 1- Calculate the BMI of each individual.
- 2- Identify, by referring to document 1, the category to which each individual belongs.

Document 2 reveals the life style and the food ration of each of the individuals A, B, and C.

		Individual A	Individual B	Individual C
Life style		Moderate activity	Sedentary (no activity)	Moderate activity
Food ration (g)	Carbohydrates	117		117
	Proteins	27		27
	Lipids	31.5		64

Document 2

- 3- Compare the life styles and the food rations of these three individuals.
- 4- Draw out the cause (s) of the excess of the body mass in the concerned individuals.
- 5- Name two diseases that obese people might suffer from.

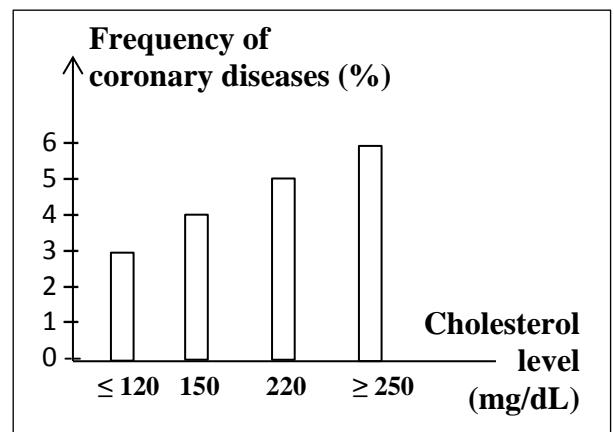
Exercise 3 (7 points)

Origin of Coronary Diseases

Coronary diseases are a major cause of deaths encountered mostly in the developed countries. Document 1 represents the relation between the frequency of these diseases and the blood cholesterol level.

- 1- Draw a table presenting the results obtained in document 1.
- 2-1- Analyze the obtained results.
- 2-2- What can you conclude?

A man is hospitalized as a result of a heart attack. The medical analyses of this man show three narrowed coronary arteries which are almost blocked.



Document 1

- 3- Name the disease that causes the narrowing of these arteries in this man.

Document 2 shows the blood levels of certain substances in this man and the corresponding normal levels.

	Blood levels in the patient (mg/dL)	Normal blood levels (mg/dL)
LDL	180	108-155
HDL	30	40-80

Document 2

- 4- Indicate the role of LDL and that of HDL.
- 5- Compare the obtained results.
- 6- What additional information does document 2 provide concerning the origin of the disease in this man?