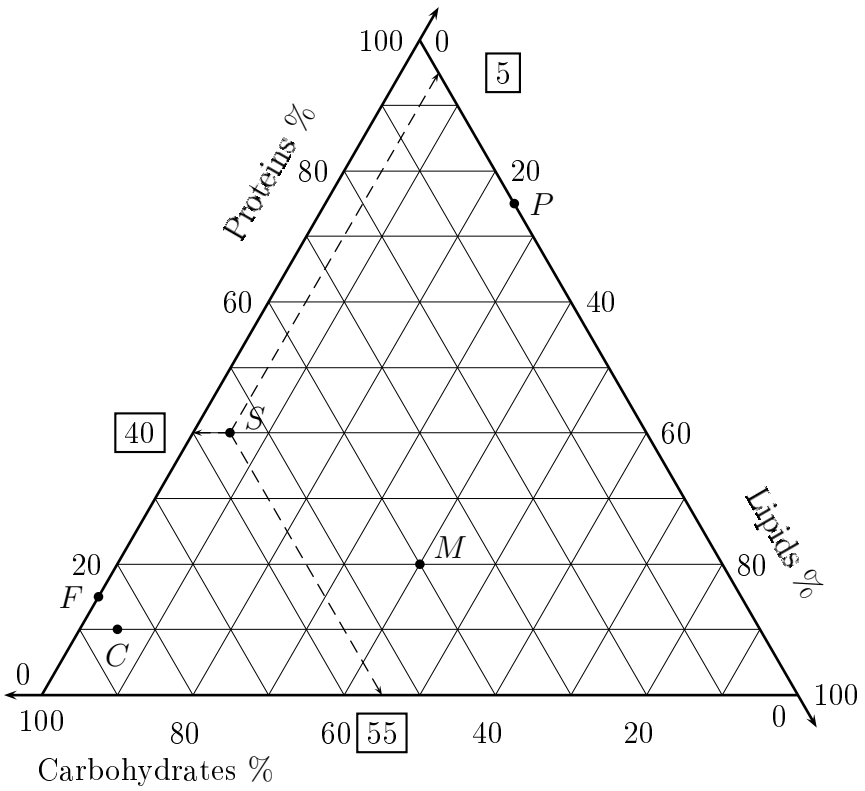
Homework #1

The CPL composition of an aliment

When analysing the quality of our food, a first approch is the composition in carbohydrates, proteins, lipids. These are the three main families of nutrients in an aliment : the carbohydrates (sugars) are a source of energy, the proteins (containing nitrogen) help build cells and muscles, the lipids (fat) store energy.
Each aliment is made of these three kinds of nutrients, with different percentages. For example, spinach is made of 55 % carbohydrates, 40 % proteins and 5 % lipids.

Part A – The aliments map

In this part, we will establish an aliments map, a graph were aliments will be represented by points. As an example the point S representing spinach has been placed. We will say that the coordinates of this point S are $(55, 40, 5)$.
To read the CPL coordinates of a point (or an aliment), lines parallel to the three axes must be drawn through this point. This construction has been done for the point S on the map. On this map also appear the points M, C , F and P representing milk, carrot, flour and fish.



CPL coordinates of an aliment

1. Give the CPL composition of milk, carrot, flour and fish.

2. Build an equaliteral triangle with side 10cm and reproduce the aliments map. Place on it the points E, H, B and A representing egg, sugar, butter and meat, according to the table below.

A few CPL compositions							
	C	P	L		C	P	L
Rice	90	10	0	Green beans	75	25	0
Biscuits	80	10	10	Meat	0	50	50
Apple pie	75	5	20	Flour			
Chocolate	70	5	25	Jam	98	2	0
Pasta	90	10	0	Butter and oil	0	0	100
Egg	0	40	60	Spinach	55	40	5
Sugar	100	0	0	Fish			
Potatoes	90	10	0	Apple	95	5	0
Bread	90	10	0	Milk			
Carrot				Honey	100	0	0
Cheese	0	50	50	Cauliflower	70	25	5
Lentils	75	25	0	Cabbage	60	35	5

3. Place the points U (cauliflower) and K (chocolate) on the map. Where, on the map can you find the aliments with 70% carbohydrates ?
4. Where can you find the aliments with the following elements ?

   (a) 50 % carbohydrates ; (b) 10 % proteins ; (c) 25 % lipids.

Part B – The ideal region

We note C, P and L the proportions in pourcentages of an aliment. For the following questions, you will crosshatch on the map the rejected zone.

1. Where are the aliments such that

   (a) $C > 50$? (b) $P > 10$? (c) $L > 25$?

2. Dietitians have established that the proportions best stuited for human beings are :

$$\begin{cases} 50 < C < 60 \\ 10 < P < 20 \\ 25 < L < 35 \end{cases}$$

   Find the adequate region on the map.
3. Which of the aliments in the above map are in this region ?

Part C – A few meals

Any meal should be conceived such that, by mixing up aliments, the proportions C, P, L are in the ideal region.

1. *Fast-food restaurants*
   The standard meal in a fast-food restaurant is made of a hamburger (35g of bread, 35g of meat), a portion of fries (90g of potatoes and 10g of oil) and a carbonated soft drink (20g of sugar).

(a) Give in grams the CPL composition of 35g of bread.

(b) Give, first in grams then in percentages, the CPL composition of a standard fast-food meal.

(c) Place on the map the point F representing this meal. Is it in the ideal region ?

2. *The pound cake*
The recipe of the *pound cake* is very simple : one fourth sugar, one fourth flour, one fourth butter, one fourth eggs (the fourth are counted over the mass of each ingredient).

(a) What are the CPL coordinates of the point Q representing the pound cake ?

(b) The point Q is not in the ideal region : change the recipe so that it is in it.