Assignment 1

Problem 1

1. Prompt the user "Enter your weight (in kgs)" and record weight
2. Prompt the user "What is your preferred unit of height? Type "F" for feet and "M" for meters" and record the preference
3. If user says "F" then prompt user "You will enter your height given as feet and inches. First enter feet" and record feet and then prompt user "Now enter inches" and record inches
4. If user says "M" then prompt user "What is your height in meters" and record height in meters
5. If user had chosen "F" then convert height into meters
6. Compute BMI using the following formula

$$\text{BMI} = \frac{\text{Weight (in kgs)}}{\text{Height }^2\text{(in m)}}$$

7. Depending on the value of BMI, report the user's type given by the following table:
   - BMI < 18.5 : UNDERWEIGHT
   - 18.5 <= BMI < 25 : NORMAL
   - 25 <= BMI < 30 : OVERWEIGHT
   - BMI > 30 : VERY-OVERWEIGHT

Problem 2

1. Write an iterative function to compute the factorial of a natural number
2. Write a recursive function to compute the factorial of a natural number.
3. Write a function to compute $\frac{x^n}{n!}$ given a float x and natural number n as arguments
4. Write a function to iteratively sum up the value $\frac{x^n}{n!}$ from $n = 1$ to a given N for a given x, i.e.,

$$F(x, N) = 1 + \sum_{i=1}^{N} \frac{x^n}{n!}$$

5. Write a function to iteratively sum up the value $\frac{x^n}{n!}$ from $n = 1$ to a chosen value of N' such that $F(x, N') - F(x, N' - 1) < \epsilon$ for a given real number x and positive small number ϵ

6. Choose two real numbers p and q and compute the following two values

$v_1 = F(p, 100) * F(q, 100)$

$v_2 = F(p + q, 100)$

Compute the difference $v_1 - v_2$ and comment on what you see.