Types and Polymorphism

- Exercises are given every week on the PL page of the SCG website (http://scg.unibe.ch/teaching/pl)
- Solutions to each assignment must be sent to mohammadreza.hazhirpasand@inf.unibe.ch
- The solutions of the assignments are to be delivered before every Thursday at 11 PM. Solutions handed in later than the specified time will not be accepted. In case of serious reasons send an e-mail to mohammadreza.hazhirpasand@inf.unibe.ch

Exercise (6 points)

1. Infer types of the functions factors, isPerfect, mH, and insert and say whether they are monomorphic or polymorphic functions. Please justify your answer. (3 pts)

   mod :: Int -> Int -> Int
   factors n = [x | x <- [1..n-1], mod n x == 0 ]
   isPerfect n = sum (factors n) == n

   insert _ n [] = [n]
   insert 0 n l = n:l
   insert i n (x:xs) = x : insert (i-1) n xs

   mH (a, b, c) = c

2. Some functions can be used with different argument types, but rarely with any type. Consider the square function, and identify which type is invalid. Please justify your answer. (1 pts)

   square :: Int -> Int
   square :: Float -> Float
   square :: Char -> Char
   square :: Double -> Double

3. Define a function to calculate the circumference of a circle and the area of a rectangle. It is required to define a union type containing the necessary parameters of a circle and a rectangle. (2 pts)

   Hints :
   Circumference of a circle : 2 * 3.14 * r
   Area of a rectangle : l * w