Introduction to ComputING

Section G

Assignment 3 – WRITING PSEUDOCODES

DUE: tuesday 16, September, 2014.

**note:** You have to write the pseudo codes on paper. Typed pseudo codes will **not** be accepted. Hand over your assignment to Miss Zainab before the class. After class it would NOT be possible to submit your assignment.

**PROBLEM 1**

Write a psedo-code to implement the following game:

The computer asks the user to roll a die and input the score (between 1 and 6).

If the score is 2 then the computer announces “you have won the game” and the game ends.

If the score is 6 then the computer asks the user to roll the die again and the game continues

If the score is odd then the computer asks the user to roll the die again and input the score. On the next attempt if the score is 1 then the computer announces ‘you have lost the game’ and the game ends, otherwise the computer asks the user to roll the die again and the game continues

If the score is 4 then the computer announces “the game is a draw”.

**PROBLEM 2**

A number *x* can be determined to be a prime number by a method called trial division. Check if *x* can be divided by 2,3,4,…sqrt(*x*). If it can be divided then it is not a prime number otherwise it is. For example, to check if 29 is a prime number, take the square root of 29 and round it to the nearest integer, i.e., 5.3852 would be 6. Now check if 29 is divisible by 2,3,4,5 or 6. As it cannot be divided by any of these numbers it is a prime number.

**PROBLEM 3**

It is known from Babylonian times that the square root of a number can be approximated by a method now known as ‘divide and average’ method. Since it was used by the Babylonians, it is also called the Babylonian algorithm.

METHOD: Suppose we want to compute the square root of a number Q

* Let A>0 be a guess for sqrt(Q), then a better approximation is given by: B=(A+Q/A)/2.
* We can then improve the approximation B using C=(B+Q/B)/2.

EXAMPLE: For example, lets compute : sqrt(2).

* Let our initial guess be 1.
* The next better approximation is (1+2/1)/2=1.5
* The next better approximation is (1.5+2/1.5)/2=1.416667
* The next better approximation is (1.416667+2/1.416667)/2=1.414216
* And so on. The more you repeat this, the closer you will get to the actual answer. Just keep in mind that the sqrt of 2 is an irrational number, which means that you can keep on improving your approximation for ever.

Write the psedo code for this method, that runs the iterations 5 times.

**PROBLEM 4**

The GCD of two numbers a & b, a<b is computed as:

* GCD(a,b) = b if a = 0
* GCD(a,b)=GCD(b mod a, a)

The above method is also known as Euclid’s method. For example:

Lets compute GCD( 48,180) (we will take a=48 and b=180 as a,b)

GCD(48,180)

= GCD(180 mod 48,48) = GCD(36,48)

= GCD(48 mod 36, 36) = GCD(12,36)

= GCD(36 mod 12,12) = GCD(0,12) = 12

Write the pseudo code for this problem.

**PROBLEM 5**

Write the pseudo code for guessing a number, as discussed in class. So for example if comparison with 5 is needed then the computer can ask the queston ‘is the number 5’. The user will give 3 possible responses, 0,1,2. 0 means the number is greater than 5. 1 means the number is less than 5 and 2 means the number is the same as 5.

Can you detect if the user is cheating and not giving the correct responses? How?