# Stack-based Programming

- 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 5 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 1 (4 points)

- What kinds of stacks does PostScript manage and what are their roles? (1 pts)

- What is the way of defining a procedure in the PostScript program? please also define a procedure
  to calculate the following formula and print the result on the screen : (( x + y ) / 2) * 2 (2 pts)

- Define a procedure to print 10 random numbers (using loops) and each number must be printed in
  a new line. *hint: "rand" produces random number* (1 pts)

  sample output:
  684570285
  1502883016
  252193898
  ...

## Exercise 2 (2 points)

Define a procedure in PostScript that will calculate and print the first n Catalan numbers, where n is an
argument on the stack. Catalan numbers are calculated based on the formula $C_n = \dfrac{(2n)!}{(n+1)!n!}$. The
call to the procedure should look like  n catalan . The output should be similar to the one shown
in Figure 1 for n = 17. Please use the provided template which contains the skeleton of the code, as
it will make it easier for you (and us) to check your solution. Try to define sub-procedures whenever it
makes sense.

```
C ( n = 0 ) = 1.0
C ( n = 1 ) = 1.0
C ( n = 2 ) = 2.0
C ( n = 3 ) = 5.0
C ( n = 4 ) = 14.0
C ( n = 5 ) = 42.0
C ( n = 6 ) = 132.0
C ( n = 7 ) = 429.0
C ( n = 8 ) = 1430.0
C ( n = 9 ) = 4862.0
C ( n = 10 ) = 16796.0
C ( n = 11 ) = 58786.0
C ( n = 12 ) = 208012.0
C ( n = 13 ) = 742900.0
C ( n = 14 ) = 2.67444e+06
C ( n = 15 ) = 9.69485e+06
C ( n = 16 ) = 3.53577e+07
C ( n = 17 ) = 1.29645e+08
```

Figure 1: Catalan numbers