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: \((x + y) / 2 \times 2\) (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 \(C_n = \frac{(2n)!}{(n+1)!n!}\). 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.
\begin{center}
\begin{tabular}{ l c }
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 \\
\end{tabular}
\end{center}

Figure 1: Catalan numbers