Python Programming

Programming Exercises 01

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Resources and Acknowledgements

- Intro to Programming with C++
  - Abhiram Ranade, Prof CSE, IIT Bombay
- A first course in programming
  - https://introcs.cs.princeton.edu/python/home/
  - https://introcs.cs.princeton.edu/java/home/
- Python for everybody
  - https://www.py4e.com
- Web Applications for everybody
  - https://www.wa4e.com
- Turtle Graphics
  - https://docs.python.org/3/library/turtle.html
- https://www.w3schools.com/python/
  - Basic Python Tutorial

Progrmming Exercises:

- Ex 01: Compute e^x given n and x

  $e^x = x^0/0! + x^1/1! + x^2/2! + ...+ x^n/n!$

- Ex 02: Compute e^x given n and x using recursion

  $e_n(x) = e_{n-1}(x) + x^n/n!$, and

  $x^k/k! = (x^{k-1}/(k-1)!)*x/k$

- Ex 03: Take `n` as input natural number and return the smallest palindrome larger than `n`
- Ex 04:
  - Compute `D(r)`, which is the number of ways in which numbers `1` thru `r` can be arranged in a sequence such that `i` is never in the i^{th} position for all `i`.

$$D(r) = \sum_{k=0}^{r} (-1)^k \frac{r!}{k!}$$

Progrmming Exercises:

- Ex05
  - Write a program that implements La-Russe algorithm for multiplication of two numbers `A` & `B`.
  - The algo works as follows,
    - Divide `A` by `2` and multiply `B` by `2`.
    - Repeat the above process till A becomes `1`.
    - For all those combinations of `A` and `B`, whenever `A` is odd, add all such values of `B`
    - The result will be multiplication of two numbers.
    - You should be able to do it only using one extra variable other than that for `A` & `B`

Progrmming Exercises:

- Using `turtle` package and only following functions
  - forward(x): moves x pixel in the direction
  - left(x): turns left with angle xo
  - right(x): cursor turns right with angle x0
- Ex06:
  - Draw empty polygon of `n` sides, each of size `x`
- Ex07:
  - Draw solid polygon of `n` sides, each of size `x`

Questions