Python Programming (B.Tech CSE - Sem 2)
Experiment 06 – Exercise Sheet
Functions, Recursion, and Lambda

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Repository: `https://github.com/tali7c/Python-Programming`

Note: This document contains only problem statements (no solutions).

Instructions

- Write a separate Python program for each exercise.
- Use functions to structure your logic.
- Add a base case for every recursive function.
- Use lambda only where it improves clarity (short, one-line functions).

Exercises

Exercise 01: Max and Min Without Built-ins

Write a function that finds the maximum and minimum of a list **without** using built-in `max()` or `min()`.

Input: a list of integers
Output: maximum and minimum (handle empty list appropriately)

Exercise 02: Sum of Cubes

Write a function `sum_cubes(n)` that returns the sum of cubes of positive integers smaller than n:

$$1^3 + 2^3 + \cdots + (n-1)^3$$

Input: integer n
Output: sum of cubes

Exercise 03: Recursive Print (1 to n)

Write a recursive function that prints integers from 1 to n in increasing order.

Input: integer n
Output: numbers 1 to n, one per line

Exercise 04: Recursive Fibonacci Series

Write a recursive function `fib(n)` and use it to generate the first n terms of the Fibonacci series.

Input: integer n (number of terms)
Output: the Fibonacci series (first n terms)

Exercise 05: Lambda for Volume of a Cone

Create a lambda function to compute the volume of a cone:

$$V = \frac{1}{3}\pi r^2 h$$

Input: radius r and height h
Output: cone volume

Exercise 06: Lambda for (max, min)

Write a lambda function that takes a list and returns a tuple `(max, min)` using built-in functions.

Input: a list of integers
Output: a tuple `(max, min)`

Exercise 07: Function Arguments Demonstration

Write functions demonstrating:

- default argument (`msg="Hello"` in a greeting function),
- variable-length positional arguments (`*args`),
- variable-length keyword arguments (`**kwargs`).

Input: function calls of your choice
Output: printed results showing that all cases work

Exercise 08: Check All Dictionary Values Are Same

Given a dictionary, check whether all values are the same. Use a lambda function in your implementation.

Input: a dictionary
Output: `True` or `False`

Exercise 09: Create Dictionary From Two Lists

Read two lists (keys and values) and create a dictionary by pairing them.

Input: list of keys and list of values
Output: constructed dictionary