# Object-Oriented Programming and Design - Monsoon 2024

Assignment 1 – Basic Programming Practices

Arani Bhattacharya

This assignment carries a total of 60 marks. There are two questions, carrying 35 and 25 marks respectively. Additional instructions given at the end of this question need to be followed.

1. In India, taxes on investment in houses and real estate are collected using Long-term Capital Gains Tax (LTCG). The traditional technique used to identify the taxable income on investment using LTCG is to compute the difference between the selling price and the cost price. This amount is then adjusted with the rate of inflation to identify the actual profit made, and a 20% tax is imposed on this actual profit.

   For example, suppose your real estate property gains in value by 15% per annum, but there is an inflation of 6% per annum. You decide to sell the property after a total of 15 years. If the initial cost price was Rs 20 lakhs, the actual **selling price** is computed as $20 \times (1 + \frac{15-6}{100})^{15}$. You may ignore the effect of inflation and increase in value for the year of selling.

   Now, suppose that you have bought a property in the year 2010 for Rs 50 lakhs, and the rate of inflation and increase in property rates on a yearly basis are given in the CSV file (from 2001 till 2030). Write a program that takes as input the year of selling, and outputs the estimated selling price and the consequent LTCG to be paid.

2. In 2024, the budget proposed a crucial change to the above LTCG scheme. It reduced the LTCG rate to 12.5%, but also removed the process of adjustment of inflation. Repeat the same computation as above, and compare which taxation scheme leads to higher taxes and by how much.

## What and How To Submit

- The C++ program sources. Classes need to be used to model the inflation rate and the tax rate.
- `Makefile` to compile the source and generate the running binary for the shell. The Makefile should generate two versions of the binary – one for debugging and another for optimized execution.
- A readme text file, explaining the commands needed to build the file, and the format of the input files. If code is copied from anywhere else (note that copying from any other student is plagiarism, but using textbook or open-source code is allowed), that should be mentioned here.

- At least 4 significant commits on a **private** github repository, with proper descriptions of the commits. You may have as many commits as you wish.
- At least 2 branches on github, one of them called main. The second branch should be used for the second question.
- Multiple functions dividing the program into logical units.
- Utilization of templates and template libraries are not allowed.
- Checks on input for validity is compulsory.
- Make the assigned TA the admin of the github repository, **and** submit the same code in zipped form on Google Classroom by the due date.

## Grading Rubric

For Q1:

1. Successful compilation using Makefile – 5 marks. No marks if Makefile also runs the binary.
2. Ability to parse the file correctly – 5 marks.
3. Ability to take input from user and perform proper check – 5 marks
4. Proper computation (note that unnecessary computations will be penalized) – 5 marks
5. Proper printing of output, including rounding (needs to explain clearly what the value being printed is) – 5 marks
6. Proper utilization of functions – 5 marks
7. Proper utilization of git and github – 5 marks (Note that using a public github repository might lead to you losing all the marks in this assignment.)

For Q2:

1. Proper computation – 5 marks
2. Proper extra output – 5 marks
3. Proper commits of code in branches – 10 marks
4. Proper utilization of functions, including proper names – 5 marks

In addition, there will be -5 in case of a missing readme file. Another -5 in case of binaries being present in the git repositories.

## Late Submission Policy

- -0.25 per hour for the first 96 hours.
- Submissions beyond 4 days of delay would only be accepted with official leaves of absence.