

Financial Programming in C++: Homework  
Assignment 2  
Fall 2025,  
MSQF, Fordham University

Due: September 10th, 2025

## Problem 0

Unzip the file `homework2.0.cpp` and rename it to `homework2.cpp`.

For each one of the problems below, in the file `homework2.cpp`:

- write the expression for each problem in the place indicated by the homework.
- Using `std::cout` output the name of the variable and its value to the terminal
- For each problem, use the variable input values provided in the source file `homework2.cpp`

## Problem 1.1

Evaluate the expression:

$$y_1 = 2 + 3x + 4x^2$$

## Problem 1.2

Evaluate the expression:

$$y_2 = \frac{x}{1+x} \exp(-2 * x)$$

## Problem 2.1

Evaluate the polynomial:

$$y_3 = a_0 + a_1x + a_2x^2 + a_3x^3$$

## Problem 2.2

Evaluate the fraction:

$$y_4 = \frac{a_0 + a_1x}{a_2 + a_3x}$$

## Problem 3.1

A call option has payout at maturity

$$\text{call} = \begin{cases} S - K & \text{if } S > K \\ 0 & \text{otherwise} \end{cases}$$

Using a **if/else conditional statement**, write an expression for the payout of a call option given the values of  $S$  and  $K$ . Evaluate the expression with the values of  $S$  and  $K$  provided in `homework2.cpp`.

## Problem 3.2

A put option has payout at maturity

$$\text{put} = \begin{cases} K - S & \text{if } S < K \\ 0 & \text{otherwise} \end{cases}$$

Using a **if/else conditional statement**, write an expression for the payout of a put option given the values of  $S$  and  $K$ . Evaluate the expression with the values of  $S$  and  $K$  provided in `homework2.cpp`.

## Problem 3.3

write an expression for the value of option (either a call or a put ) given by the following formula:

$$\text{option} = \begin{cases} S - K & \text{if is call and } S > K \\ K - S & \text{if is put and } S < K \\ 0 & \text{otherwise} \end{cases}$$

Using a chain of **if/else conditional statements**, write an expression for the payout of a put option given the values of  $S$  and  $K$  and the boolean variable `is_call`.

## 1 3.4

The call and put option payouts can also be written in terms of the `max` function as follows:

$$\begin{aligned}\text{call} &= \max(S - K, 0) \\ \text{put} &= \max(K - S, 0)\end{aligned}$$

Using the standard library function `std::max` write expressions for the payout of a call and put options.

**HINT** `std::max(a,b)` takes two `double` values as inputs.

## Problem 4

The price of a bond with expiry in  $T$  years and coupon  $c$ , when the level of interest rates is  $r$  is given by the formula:

$$\text{bond\_price} = \sum_{t=1}^T c \exp(-rt) + \exp(-rT)$$

### 1.1 Problem 4.1

Use a `while` loop to compute the bond price.

### 1.2 Problem 4.2

Use a `for` loop to compute the bond price.

## Submissions

You must submit two files to complete this homework:

1. The file `homework.cpp` completed with the solutions to problems 1 to 4.
2. A file `homework.txt` with the output of running the executable compiled from `homework.cpp`.