6 Team homework projects

6.1 Main information

- Each team: 3 to 5 students
- Due date: November 30
- Format: a script (an R file)
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6.2 Exercise 1: Financial data management

Build two functions `compute_draw_down` and `compute_max_draw_down`.

6.3 Exercise 2: Performance measurement

Build a function `compute_ES` estimating the *expected shortfall* (using a parametric approach in the discrete and Gaussian cases) of `v_data_returns`. Let $ES(\alpha)$ be

$$ES(\alpha) = \mu - \sigma \times \frac{\phi(\psi^{-1}(\alpha))}{1-\alpha} \tag{1}$$

6.4 Exercise 3: Portfolio optimization

Extend function `compute_simul_weights` to allow a user to restrict the weighting scheme so that `max_weight` $= 95\%$ and `min_weight` $= 5\%$ for all assets. Before extending `compute_simul_weights`, you need to develop a function `test_weight` that checks if the simulated weights satisfy the condition `weight < max_weight AND weight > min_weight`. This function should return a Boolean variable (`TRUE` / `FALSE`).

Here are some tips that may help you develop function `test_weight` and then use it in function `compute_simul_weights`:

```
# Declare and define vectors defining max and min weights
max_weight <- vector("numeric", length = Number_Assets)
min_weight <- vector("numeric", length = Number_Assets)
max_weight <- rep(0.95, Number_Assets)
min_weight <- rep(0.05, Number_Assets)

# Function testing a set of simulated weights
test_weight <- function(v_vector_weights = input_weights){
    ...
    return(b_result)
}
```