1. Construct an "AmericanOption" class which contains at least the following:
   - Constructors.
   - Destructor.
   - Parameters: $S, K, r, \sigma, T$ and type of option.
   - Pricing function (for call and put) using Explicit method
   - Pricing function (for call and put) using penalty method.
   - Function that displays the prices on the screen.

2. A derived class from "AmericanOption" (say MCarloAmerican) with the following members:
   - Constructors.
   - Destructor.
   - Parameters: number of iterations.
   - MonteCarlo price (Call and Put).
   - Function that displays the price on the screen.

Remark: Test your code in C++;
Use Armadillo for your random number generation;
Test your code with the following set-up:

```cpp
S=100, K=100, r=0.1, sigma=0.25, T=1, N=50000 (for MC);
type1 = "call"
type2 = "put"
```

Here "N" is the number of iterations for Monte Carlo method.