Exercise 2 – First-order methods

The test function for this exercise will be the Rosenbrock function:

$$f(x) = (a - x_1)^2 + b(x_2 - x_1^2)^2,$$

with $a = 1$ and $b = 5$.
Your job is to program two first order methods for optimization of the Rosenbrock function, namely:

- Gradient method, with:
  - optimal stepsize α obtained from a bracketing method of your choice (with the number of possible evaluations for each bracket equal to 50)
  - decaying stepsize: $\alpha = 0.9^k$ (where k is the iteration number)
- Conjugate gradient method with optimal stepsize (as above) and the Polak-Ribiere equation for β

As the starting point set $x^{(0)} = [-1, -1]^T$ and set the termination criteria as both maximum number of iterations (max 100), and size of the gradient (less that 1e-2). Visualize the trajectories of the iterations.