

# Optimization and Algorithms

## Project report

Group 58

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### 1 Task 1

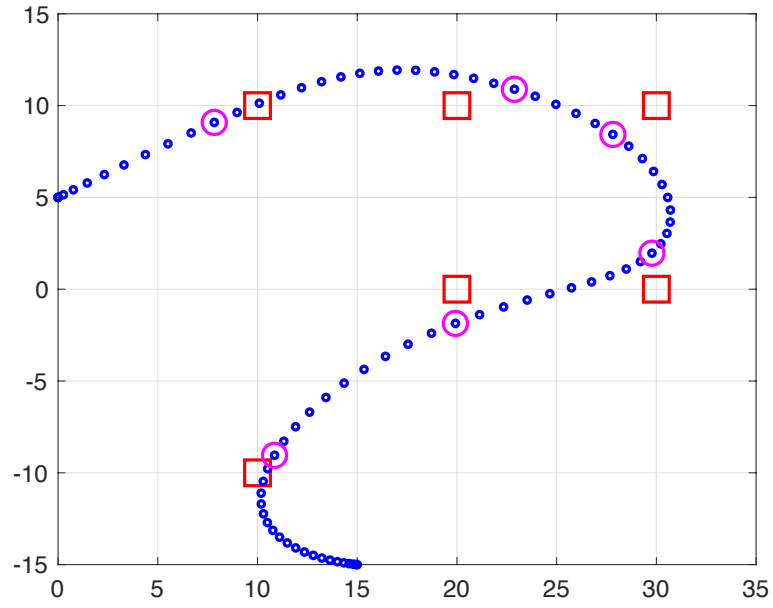
Note that each task has its own section. So, put all the data (figures, numbers, tables) asked for in a task in its own section.

Plutting a matlab file code in your report is easy:

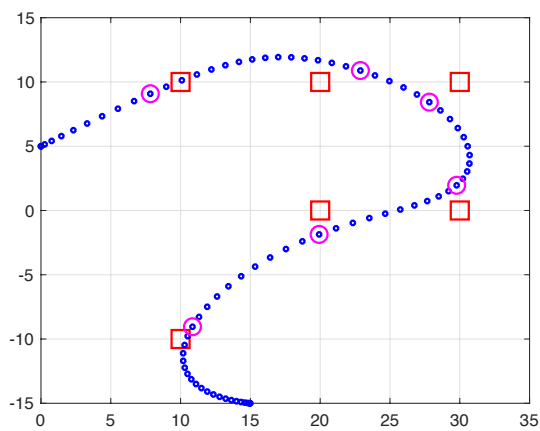
```
1  % portfolio.m; uses package CVX from http://cvxr.com/cvx
2  n = 10; % number of stocks
3  r = 1+0.3*rand(n-1,1); % generate random returns
4  r = [ r ; 1 ]; % the last one is a risk-free asset
5  T = 1000; % set budget
6
7  % solve the optimization problem
8  cvx_begin quiet
9      variable x(n);
10     maximize(r'*x);
11
12     %subject to
13     x ≥ 0; sum(x) == T;
14     for i = 1:n
15         for j = i+1:n
16             x(i) + x(j) ≤ 0.8*T;
17         end;
18     end;
19 cvx_end;
20
21 figure(1); clf; % plot solution
22 subplot(1,2,1); stem(r, 'LineWidth',5);
23 title('rates of return r');
24 subplot(1,2,2); stem(x, 'r', 'LineWidth',5);
25 title('optimal portfolio x');
```

Figure ?? shows a single picture.

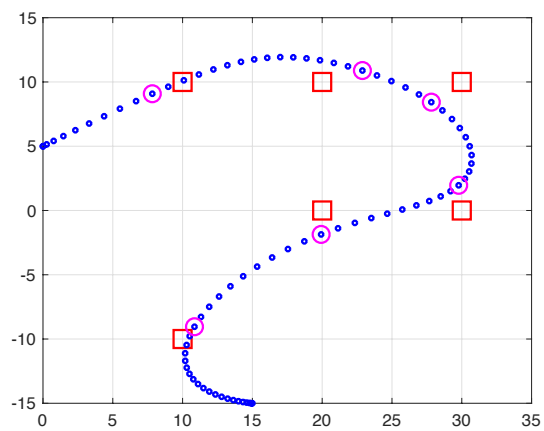
Figure ?? show two pictures, side by side.



**Figure 1:** Positions of the robot from  $t = 0$  to  $t = T$  are the small blue circles; the positions at appointed times  $\tau_k$ , for  $1 \leq k \leq K$ , are the large magenta circles. The waypoints are the red squares. Case  $\lambda = 10^{-1}$  with  $\ell_2^2$  regularizer.



(a) Caption A



(b) Caption B

**Figure 2:** A figure with two pictures.

Sometimes, a table is the most useful way to give information. See table ?? for an example.

$\lambda$	$d_1$	$d_2$
$10^{-3}$	25.98	0.03
$10^{-2}$	18.97	1.05
$10^{-1}$	16.65	2.79

**Table 1:** An example of a table.

**2 Task 2**

**3 Task 3**

**4 Task 4**