Homework 9

You have collected data on monthly returns of 10 securities, as shown in the table below

	Monthly Returns											
Asset	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
1	0.004	-0.025	0.009	0.012	0.047	0.006	-0.019	-0.037	0.025	0.021	0.017	0.019
2	0.014	0.000	-0.039	0.016	-0.006	-0.021	0.07	-0.022	0.019	0.025	0.054	0.040
3	0.001	0.006	0.005	0.019	0.016	-0.052	0.057	0.027	0.039	0.000	0.011	0.002
4	-0.012	-0.021	0.062	0.036	-0.002	0.015	-0.038	-0.003	0.024	0.012	0.048	-0.007
5	-0.043	0.005	0.023	0.000	0.023	0.034	0.04	0.029	-0.013	-0.040	0.011	0.003
6	0.015	-0.027	-0.010	-0.027	0.002	0.056	0.038	-0.004	0.080	0.001	0.013	0.026
7	-0.001	0.011	0.056	-0.024	0.019	-0.015	-0.048	0.019	0.062	0.023	0.002	-0.017
8	0.039	0.030	0.003	-0.004	0.016	0.003	-0.021	0.018	-0.026	-0.022	0.026	0.073
9	0.017	0.020	-0.024	-0.004	0.019	-0.03	0.039	0.025	0.021	0.054	-0.011	0.056
10	0.108	-0.003	0.061	0.008	0.024	-0.013	-0.037	0.053	-0.009	-0.021	0.026	-0.009

These data are the same as in the previous homework.

You treat these realizations as equally likely scenarios, each with probability 1/12.
You plan to invest $100,000

Problem 1

(a) Find the portfolio minimizing the Average Value at Risk at level $\alpha = 0.3$.
(b) Solve the problem of minimizing the function

$$-(1-c)\, E[Z(x)] + c\, AVaR[Z(x)]$$

for $c = 0.23, 0.5, 0.75$ and with $\alpha = 0.3$.

In both (a) and (b) consider only the case without short-selling.

Problem 2

. Solve the problem of minimizing the risk measure

$$\rho\,[Z(x)] = -E[Z(x)] + c\,\sigma[Z(x)]$$

where $\sigma[Z] = E\{\max(0, E[Z] - Z)\}$ is the lower semideviation of first order.

for $c = 0.23, 0.5, 0.75$.

Consider only the case without short-selling. Plot the results on the mean--σ plane.