EXAM – Investment analysis

Name:

1, Compute the semivariance of a loss described by random variable with uniform distribution on interval [-3,3]. (2 points)

2, Consider two functions on interval [-1,1]:
f(x) = -x for $x\epsilon[-1,0]$ and f(x) = 0 for $x\epsilon[0,1]$
g(x) = 0 for $x\epsilon[-1,0]$ and f(x) = x for $x\epsilon[0,1]$.
a, Find at least one efficient solution when jointly minimizing f(x) and g(x) on interval [-1,1].
b, How many efficient solutions exist when jointly minimizing f(x) and g(x) on interval [-1,1]?
(2 points)

3, Proof that mean absolute deviation always (for all probability distributions) satisfies axiom (assumption) of subaditivity. (2 points)

4, Investor decides how to split his money into two investments: asset A and asset B. His goal is to minimize CVaR of portfolio loss under condition that mean (expected) return of portfolio is greater than 1%. The returns of assets depend on the scenarios of future evolution (two possible scenarios, with the same probabilities – good and bad). In the case of good scenario, the return of asset A is 3% and the return of asset B is 5%. In the case of bad scenario, the return of asset A is 0% and the return of asset B is -1%, that is, asset B realizes 1% loss. Formulate the investor's problem as a mean-risk model. (2 points)

5, Assume that a loss of an investment is described by a random variable with probability density function:
f(x) = x+1 for $x\epsilon[-1,-0.5]$
= 0.5 for $x\epsilon[-0.5,0.5]$
= 1-x for $x\epsilon[0.5,1]$

Compute Value at Risk of this investment at level $\alpha = 0.98$. (2 points)