Optimization Models in Finance
(Prof. Andrzej Ruszczyński)

ASSIGNMENT 10 *(due Tuesday, December 3, 2019)*

Problem

A random variable Z has realizations $z_1, z_2, \ldots, z_K$, attained with probabilities $p_1, p_2, \ldots, p_K$. It represents **gains**.

(a) Formulate a linear programming problem to calculate the following measure of risk:

$$\rho(Z) = -\frac{1}{3}\mathbb{E}[Z] + \frac{2}{3}\mathrm{AVaR}^{-}_{\alpha}[Z], \quad \alpha \in (0,1].$$

(b) Derive the dual representation of the risk measure $\rho(\cdot)$.

(c) What are the limits of $\rho(\cdot)$ when $\alpha \downarrow 0$ or $\alpha = 1$.