Operations Research

Homework 10

Due in class Tuesday, December 5, 2017

1. *(From HL, Exercise 15.3-4.)* Consider the decision analysis problem with the following payoff table (in units of thousands of dollars) under risk-neutral valuation:

Alternative	State of Nature		
	S_1	S_2	S_3
A_1	-100	10	100
A_2	-10	20	50
A_3	10	10	60
Prior Probability	0.2	0.3	0.5

(a) Which alternative should be chosen? What is the resulting expected payoff?

(b) You are offered the opportunity to obtain information which will tell you with certainty whether the first state of nature S_1 will occur. What is the maximum amount you should pay for the information? Assuming you will obtain the information, how should it be used to choose an alternative? What is the resulting expected payoff (excluding the payment)?

(c) You are offered the opportunity to obtain information which asserts the true state of nature with an accuracy of 60% and wrongly identifies one of the other possible states of nature in %20 of cases each. What is the maximum amount you should pay for the information? Assuming you will obtain the information, how should it be used to choose an alternative? What is the resulting expected payoff (excluding the payment)?

2. Use the graphical method to maximize

$$z = x_1 + x_2 \tag{1}$$

subject to

$$x_1^2 + x_2^2 \le 1, \tag{2}$$
$$x_1, x_2 \ge 0. \tag{3}$$