BLDG 658f Instructor: T. Stathopoulos

Assignment 2

1) Apply the various decision under uncertainty criteria of choice to the matrix below. The values in the matrix are cost units.

	S_1	S_2	S_3	S_4
A_1	\$13	\$13	\$5	\$9
A_2	8	8	8	8
A_3	0	21	5	5
A_4	9	17	5	5
A_5	5	7	7	5

2) You are setting up your own consulting office with very limited financial backing. One of the first problems is to set a fee-per-hour level . If your fee is too large, you will lose clients, and if your fee is too small, you will not receive adequate payment for your services and, in addition, will find it difficult to increase your income from this set of clients. You are considering charging \$20/hr or \$25/hr. These are the actions.

If your fee level is \$25/hr (a_1) and the business response (θ_1) is adequate, you assign the gain to be +100. If you charge the same rate and the response is unsatisfactory (θ_2), the loss is 50. If you ask for \$20/hr (a_2) and the response is adequate (θ_1), the gain is 50, while if the response is unsatisfactory (θ_2), your loss is 100. Assume:

(a) $P[\theta_1|a_1] = 0.5$ $\quad P[\theta_2|a_2] = 0.5$

(b) $P[\theta_1|a_1] = 0.3$ $\quad P[\theta_2|a_2] = 0.4$

What is the optimum action under (a) and (b)?

3) A large reinforced-concrete building is to be constructed on very poor foundation material. The building is 60 ft wide, 200 ft long, and 6 stories in height. Two basic foundation alternatives are friction piles or some type of raft foundation. A differential settlement on the order of 3 in. can be expected to involve legal problems with the client, since you have already indicated that the site is adequate for the proposed construction.

Routine tests and studies indicate that a pile foundation can be expected to show long-term differential settlements of up to 3 in. Odds cannot be quoted that the settlement will not be larger, but it is unlikely. The odds are approximately even that the differential settlement will be less than 1 in., approximately 4 to 1 that it will be less than 2 in., and perhaps approximately 1 in 100 that it will be approximately 3 in. The cost of a pile foundation is so large that it is "even money" that the client will abandon the job if this design is suggested. Use discrete states and note that the measures of likelihood must be normalized.

Studies for a raft foundation indicate that a relatively flexible slab coupled with rock surcharge around the building will be within the cost estimates. The odds are more or less even that the differential settlement will be less than 2 in. and approximately 10 to 1 that it will be less than 3 in.

If the settlement is too large, the client will take legal action against you; you expect the cost to you will be $1,000 or $10,000 with equal likelihood. Your profit on the job will probably be $3,000, providing that it goes to completion.

Set up the decision tree for this decision and determine the optimum action.