MA30118 - Question Sheet Two

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Attempt all questions. Hand in by 17:00 Friday 10th March either to me in lectures, or the envelope on my door, 1W4.8.

1. For a fee of £400, the manager in question 2. of Question Sheet One may call in a consultant. Let I_1 represent the event that the consultant predicts that business will decline, I_2 that the consultant predicts business will remain the same, I_3 that the consultant predicts business will increase moderately, and I_4 that the consultant predicts business will increase rapidly. Table 1 lists the conditional probabilities for predictions made by the consultant.

	S_1	S_2	S_3	S_4
I_1	0.80	0.10	0.20	0.10
I_2	0.10	0.70	0.20	0.20
I_3	0.05	0.10	0.50	0.30
I_4	0.05	0.10	0.10	0.40

Table 1: Conditional probabilities for the consultant's predictions.

   (a) Find the $EVSI$.

   (b) What is the net efficiency?

   (c) Comment on the value of the consultant.

2. I have been offered two investment opportunities, A and B, which require approximately the same cash outlay. The cash requirements mean that I can only afford to make at most one investment. I thus have three alternatives: make investment A (A_1); make investment B (A_2); or to not invest (A_3). The returns on my investments depends upon what happens to the stock market in the next year. With probability 0.3, the stock market may increase (S_1); with probability 0.5 it may remain stable (S_2) and with probability 0.2, the market may fall (S_3). The possible payoffs, in pounds as profits, are given in Table 2 below.

   (a) Calculate the EMV of the investment decision problem and thus state the optimal decision under this criterion.

   (b) Suppose that it is pointed out to me that both actions A_1 and A_2 could result in losses, so I decide to think about the risk of the investments. I elect to construct

	S_1	S_2	S_3
A_1	45,000	30,000	-75,000
A_2	75,000	-30,000	-45,000
A_3	0	0	0

Table 2: Payoffs for my investment choices in question 2.

a utility function over my possible payoffs. I assign the following indifference probabilities.

Profit	Indifference probability
£45,000	0.95
£30,000	0.90
£0	0.75
-£30,000	0.55
-£45,000	0.40

Construct the corresponding utility table and hence find the decision which maximises the expected utility. Comment on this decision.

3. A firm has three investment alternatives: A_1, A_2, and A_3. The return of these investments depends upon what happens to the stock market in the next year. With probability 0.4, the stock market may go up (S_1); with probability 0.3 it may remain stable (S_2) and with probability 0.3, the market may go down (S_3). The possible payoffs, in \$1000s as profits, are given in Table 3 below.

	S_1	S_2	S_3
A_1	100	25	0
A_2	75	50	25
A_3	50	50	50

Table 3: Payoffs for my investment choices in question 3.

(a) Calculate the EMV of the investment decision problem and thus state the optimal decision under this criterion.

(b) For the lottery having a payoff of \$100,000 with probability p and \$0 with probability $1-p$, two decision makers expressed the following indifference probabilities:

	Indifference probability	
Profit	Decision Maker A	Decision Maker B
\$75,000	0.80	0.60
\$ 50,000	0.60	0.30
\$ 25,000	0.30	0.15

Find the most preferred decision for each decision maker using the expected utility approach.

(c) Why don't decision makers A and B select the same decision alternative?