

## EXTRA PROBLEM 2: CONSTRUCTING DECISION TREES & INFLUENCE DIAGRAMS

The Executives of the general products company (GPC) have to decide which of three products to introduce, A, B, or C. Product C is essentially a risk-free proposition, from which the company will obtain a net profit of \$1 million. Product B is considerably more risky. Sales may be high, with resulting net profit of \$8 million, medium net profit of \$4 million, or low, in which case the company just breaks even (i.e. net profit = \$0 million). The probabilities for these outcomes are

$$\text{Pr}(\text{Sales High for B}) = 0.38$$

$$\text{Pr}(\text{Sales Medium for B}) = 0.12$$

$$\text{Pr}(\text{Sales Low for B}) = 0.50$$

Product A poses something of a difficulty; a problem with the production system has not yet been solved. The engineering division has indicated its confidence in solving the problem, but there is a slight (5%) chance that devising a workable solution may take a long time. In this event, there will be a delay in introducing the product, and that delay will result in lower sales and profits. Another issue is the price for product A. The options are to introduce it at either high or low price; the price would not be set until just before the product is to be introduced. Both of these issues have an impact on the ultimate net profit.

Finally, once product A is introduced, sales can either be high or low. If the company decides to set a low price, then low sales are just as likely as high sales. If the company sets a high price, the likelihood of low sales depends on whether the product was delayed by the production problem. If there was no delay and the company sets a high price, the probability is 0.4 that sales will be high. However, if there is a delay and the price is set high, the probability is only 0.3 that sales will be high. The following table shows the possible net profit figures (in millions) for, product A:

	Price	High Sales (\$ Million)	Low Sales (\$ Million)
Time Delay	High	5.0	-0.5
	Low	3.5	1.0
No Delay	High	8.0	0.0
	Low	4.5	1.5

(10) A. Draw a complete decision tree for GPC (DO NOT SOLVE THE TREE)

(10) B. Draw an influence diagram for GPC's decision problem. Use solid arrows for relevance arcs and dotted arrows for sequence arcs.