Example 1

Arthrodax Company has been approached by Ranger Sound with a rush order offer to purchase 100 units of a customized version of Arthrodax's SoundScreamer audio mixer at $5,000 per unit, and Arthrodax needs to decide how to respond. The electronic modifications of the standard SoundScreamer needed for this customized version are straightforward, but there will be a fixed cost of $100,000 to design the modifications and set up for assembly of the customized Sound-Screamers, regardless of the number of units produced. It will cost $2,000 per unit to manufacture the circuit boards for the units. Since Arthrodax has some short term spare manufacturing capacity, the Ranger offer is potentially attractive. However, the circuit boards for the customized units will not Ż t into the standard SoundScreamer case, and Arthrodax must decide what to do about acquiring cases for the customized units as it decides whether to accept Ranger's purchase offer. An appropriate case can be purchased at $500 per case, but Arthrodax could instead purchase an injection molder to make the cases. It will cost $20,000 to purchase the molder, and there is a 0.6 probability that it will be possible to successfully make the cases using the molder. If the molder does not work, then the purchase price for the molder will be totally lost and Arthrodax must still purchase the cases at $500 per case. If the molder works, then it will cost $60 per case to make the cases using the molder. Regardless of which case is used, the cost of assembling the SoundScreamer circuit boards into the case is $20 per unit. Unfortunately, there is no way to test the molder without purchasing it. Assume that there is no other use for the molder except to make the cases for the Ranger order.

(i) Draw a decision tree for Arthrodax's decision about whether to accept the Ranger o® er and how to acquire the cases for the customized SoundScreamers.

(ii) Using expected net profit as the decision criterion, determine the preferred course of action for Arthrodax

Example 2

This is a continuation of Example 1.. Assume that all information given in that exercise is still valid, except as discussed in this exercise. Ranger now tells Arthrodax that there is uncertainty about the number of customized SoundScreamers that will be needed. Specifically, there is a 0.35 probability that it will need 100 units, and a 0.65 probability that it will need 50 units. If Arthrodax will agree now to produce either number of units, then Ranger will pay $6,000 per unit if it ultimately orders 50 units, and will pay $5,000 per unit if it ultimately orders 100 units. The timing is such on this rush order that Arthrodax will have to make a decision about purchasing the injection molder before it knows how many units Ranger will take. However, Arthrodax will only need to purchase or manufacture the number of circuit boards and cases needed for the Ż nal order of either 50 or 100 units.

(i) Draw a decision tree for Arthrodax's decision about whether to accept the Ranger o® er and how to acquire the cases for the customized SoundScreamers. Note that this is a situation with dependent uncertainties, as discussed in Section 1.3.

(ii) Using expected net profit as the decision criterion, determine the preferred course of action for Arthrodax.