Exercise-10-

Example: A bicycle shop

Zed and Adrian run a small bicycle shop called "Z to A Bicycles". They must order bicycles for the coming season. Orders for the bicycles must be placed in quantities of twenty (20). The cost per bicycle is $**70** if they order **20**, $**67** if they order **40**, $**65** if they order **60**, and $**64** if they order **80**. The bicycles will be sold for $**100** each. Any bicycles left over at the end of the season can be sold (for certain) at $**45** each. If Zed and Adrian run out of bicycles during the season, then they will suffer a loss of "goodwill" among their customers. They estimate this goodwill loss to be $**5** per customer who was unable to buy a bicycle.

Zed and Adrian estimate that the demand for bicycles this season will be **10, 30, 50**, or **70** bicycles with probabilities of **0.2, 0.4, 0.3**, and **0.1** respectively.

- create a payoff table.
- Draw a decision tree in order to determine the best strategy.
- create an opportunity loss table. H.W

A- Create a payoff table.

Actions

There are four actions available to Zed and Adrian. They have to decide which of the actions is the best one under each criteria.

1. Buy 20 bicycles
2. Buy 40 bicycles
3. Buy 60 bicycles
4. Buy 80 bicycles

Zed and Adrian have control over which action they choose. That is the whole point of decision theory - deciding which action to take.

States of Nature

There are four possible states of nature. A state of nature is an outcome.

1. The demand is 10 bicycles
2. The demand is 30 bicycles
3. The demand is 50 bicycles
4. The demand is 70 bicycles

Zed and Adrian have no control over which state of nature will occur. They can only plan and make the best decision based on the appropriate decision criteria.

Payoff Table

After deciding on each action and state of nature, create a payoff table. The numbers in parentheses for each state of nature represent the probability of that state occurring.

	Action			
State of Nature	**Buy 20**	**Buy 40**	**Buy 60**	**Buy 80**
Demand 10 (0.2)	**50**	-330	-650	-970
Demand 30 (0.4)	550	**770**	450	130
Demand 50 (0.3)	450	1270	**1550**	1230
Demand 70 (0.1)	350	1170	2050	**2330**

.

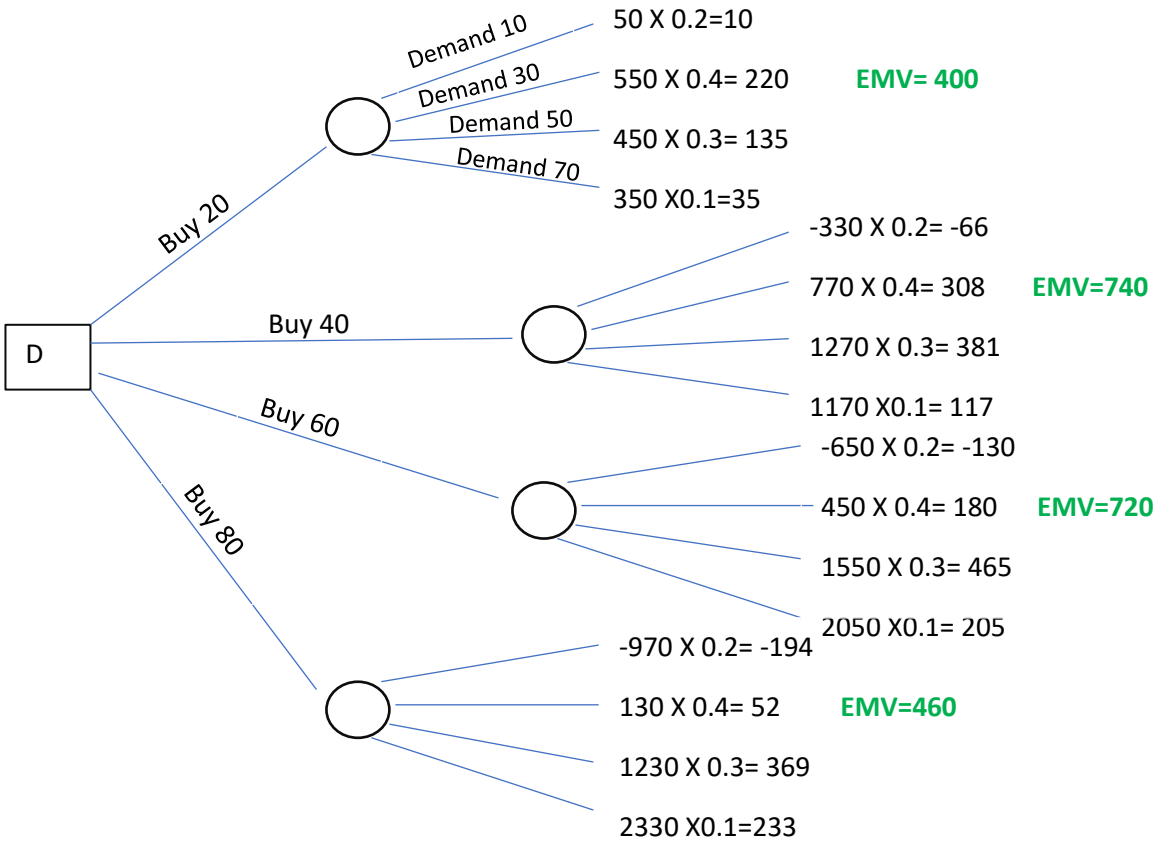
Demand is 50, buy 60:

They bought 60 at $65 each for $3900. That is -$3900 since that is money they spent. Now, they sell 50 bicycles at $100 each for $5000. They had 10 bicycles left over at the end of the season, and they sold those at $45 each of $450. That makes $5000 + 450 - 3900 = $1550.

Demand is 70, buy 40:

They bought 40 at $67 each for $2680. That is a negative $2680 since that is money they spent. Now, they sell 40 bicycles (that's all they had) at $100 each for $4000. The other 30 customers that wanted a bicycle, but couldn't get one, left mad and Zed and Adrian lost $5 in goodwill for each of them. That's 30 customers at -$5 each or -$150. That makes $4000 - 2680 - 150 = $1170.

B- Draw a decision tree in order to determine the best strategy.



The best strategy is Buy 40 bicycles.

C- Create an opportunity loss table. H.W

	Action			
State of Nature	**Buy 20**	**Buy 40**	**Buy 60**	**Buy 80**
Demand 10 (0.2)	**0**	380	700	1020
Demand 30 (0.4)	220	**0**	320	640
Demand 50 (0.3)	1100	280	**0**	320
Demand 70 (0.1)	1980	1160	280	**0**