Decision trees(basics)

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Description

Diagramming technique which uses :

- Decision points – points in time when decisions are made, squares called nodes
- Decision alternatives – branches of the tree off the decision nodes
- Chance events – events that could affect a decision, branches or arrows leaving circular chance nodes
- Outcomes – each possible alternative listed

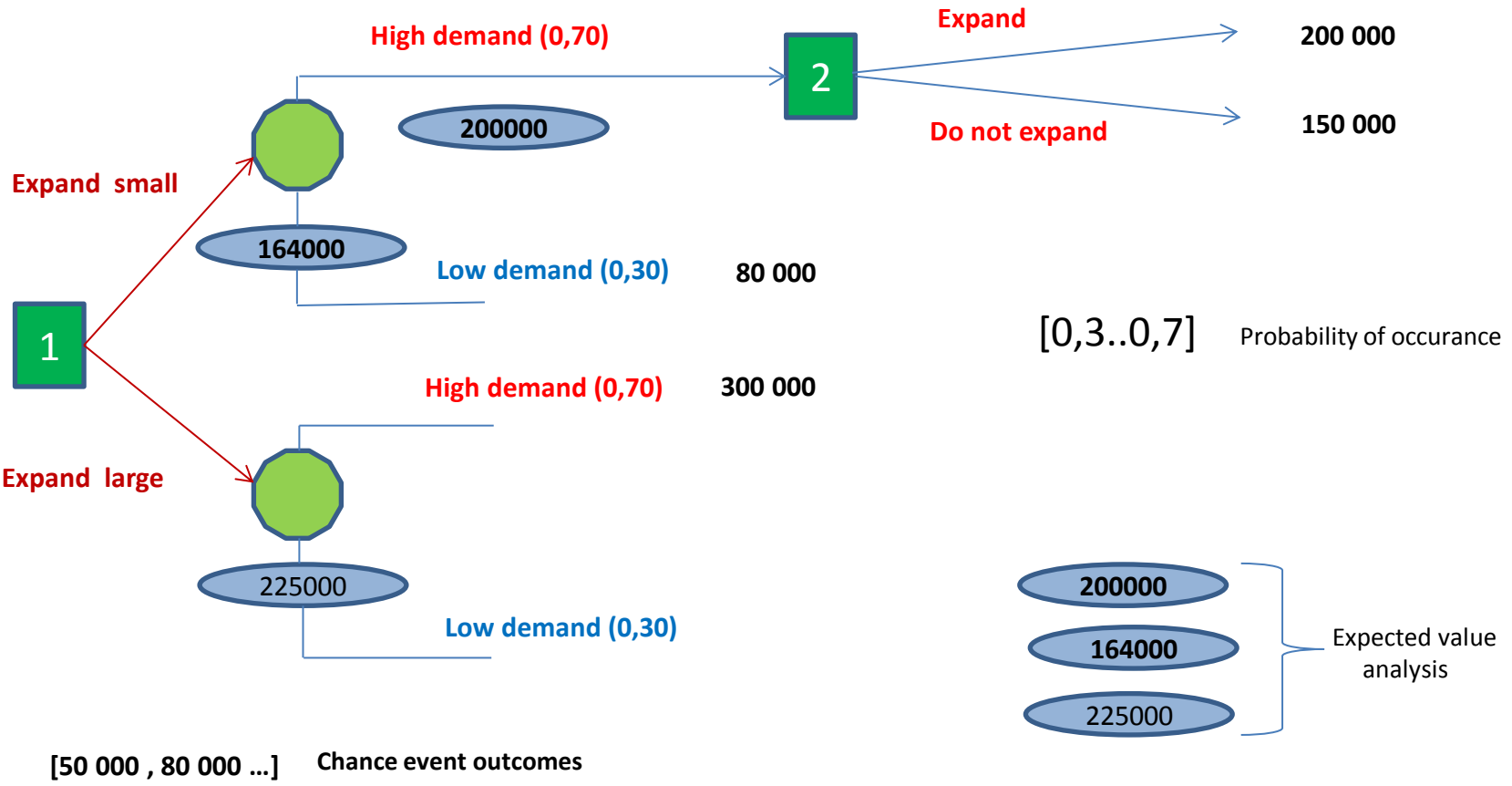
DT diagrams

Decision trees developed by

- Drawing from left to right
- Use squares to indicate decision points
- Use circles to indicate chance events
- Write the probability of each chance by the chance (sum of associated chances = 100%)
- Write each alternative outcome in the right margin

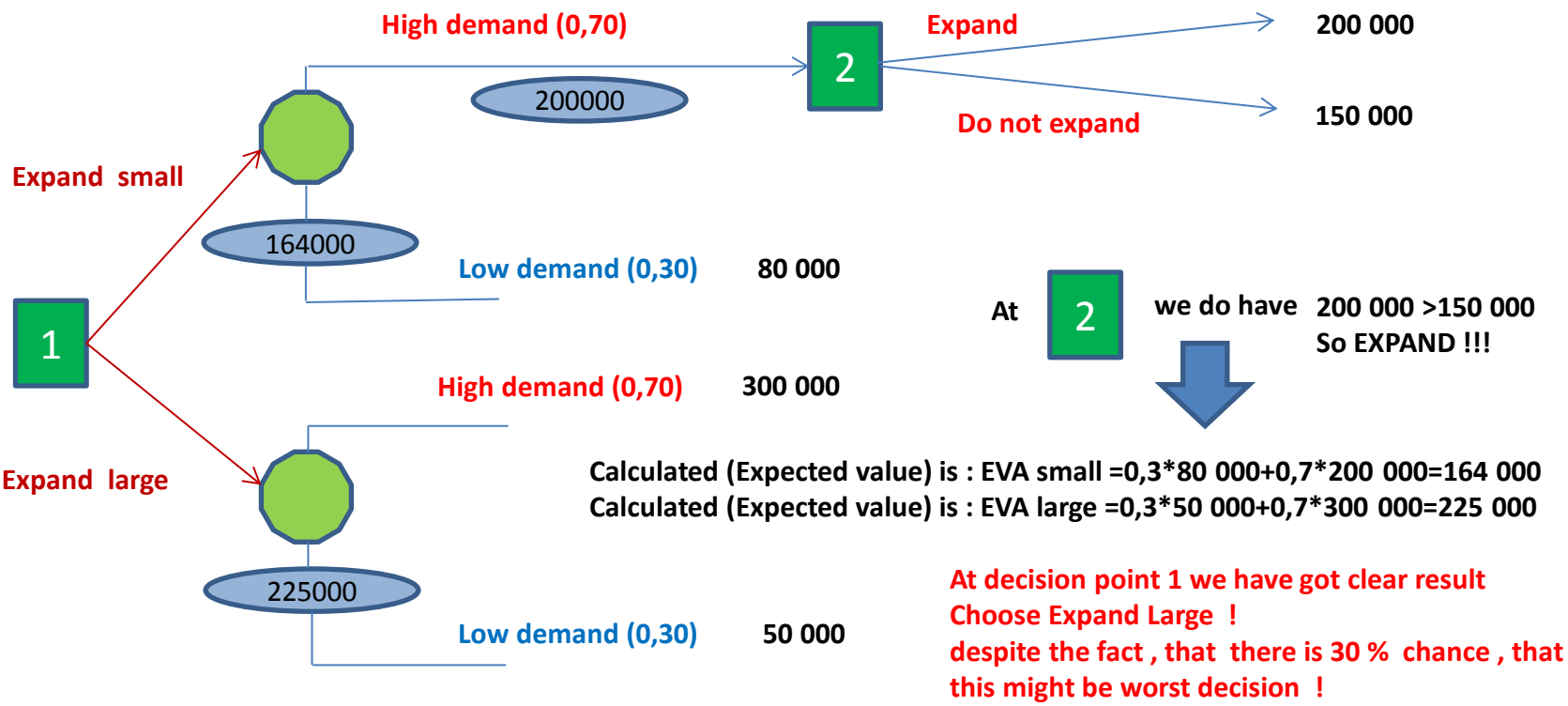
DT-Example I

- A restaurant owner has determined that he needs to expand his facility. He has two alternatives. One is one large expand now and risk smaller demand later or the second alternative is expand on a smaller scale now knowing, that he might need to expand again in three years. Which alternative would be most attractive?



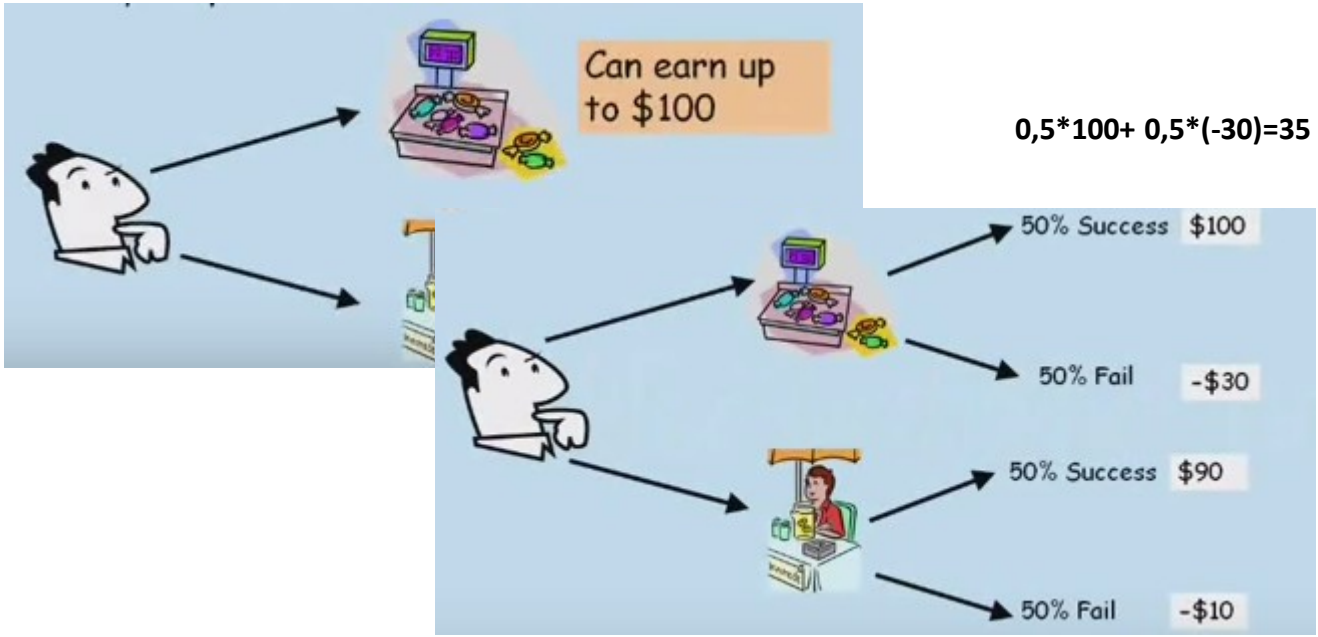
DT-Example I

- Decision tree analysis utilizes Expected Value Analysis (EVA), which is a weighted average of the chance events :
  - **Probability of occurrence * chance event outcome**



DT-Example II

- Project to sell candies or lemonade. At the first sight it is clear : Candy !!



0,5*100+ 0,5*(-30)=35 USD

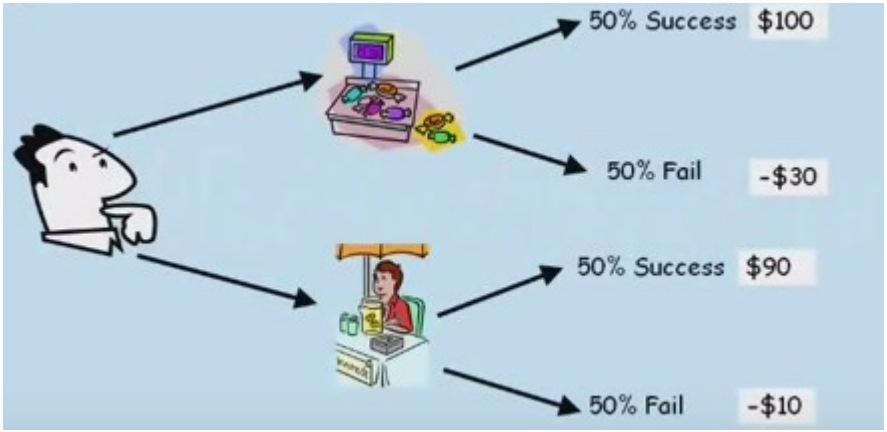
0,5*90+ 0,5*(-10)=40 USD

Resource: MBABullshit.com

DT-Example II

- So now it would be better to choose lemonade business ! So we have chosen bigger EVA. But..

0,5*100+ 0,5*(-30)=35 **0,5*90+ 0,5*(-10) = 40**



Decision based on EVA? Does this mean, that
If you do Lemonade project, you will earn 40? **NO !**

If you did the IDENTICAL Lemonade project
very many times (in exactly the same situation), then your **average** earnings will be **probabl**y 40 per time.

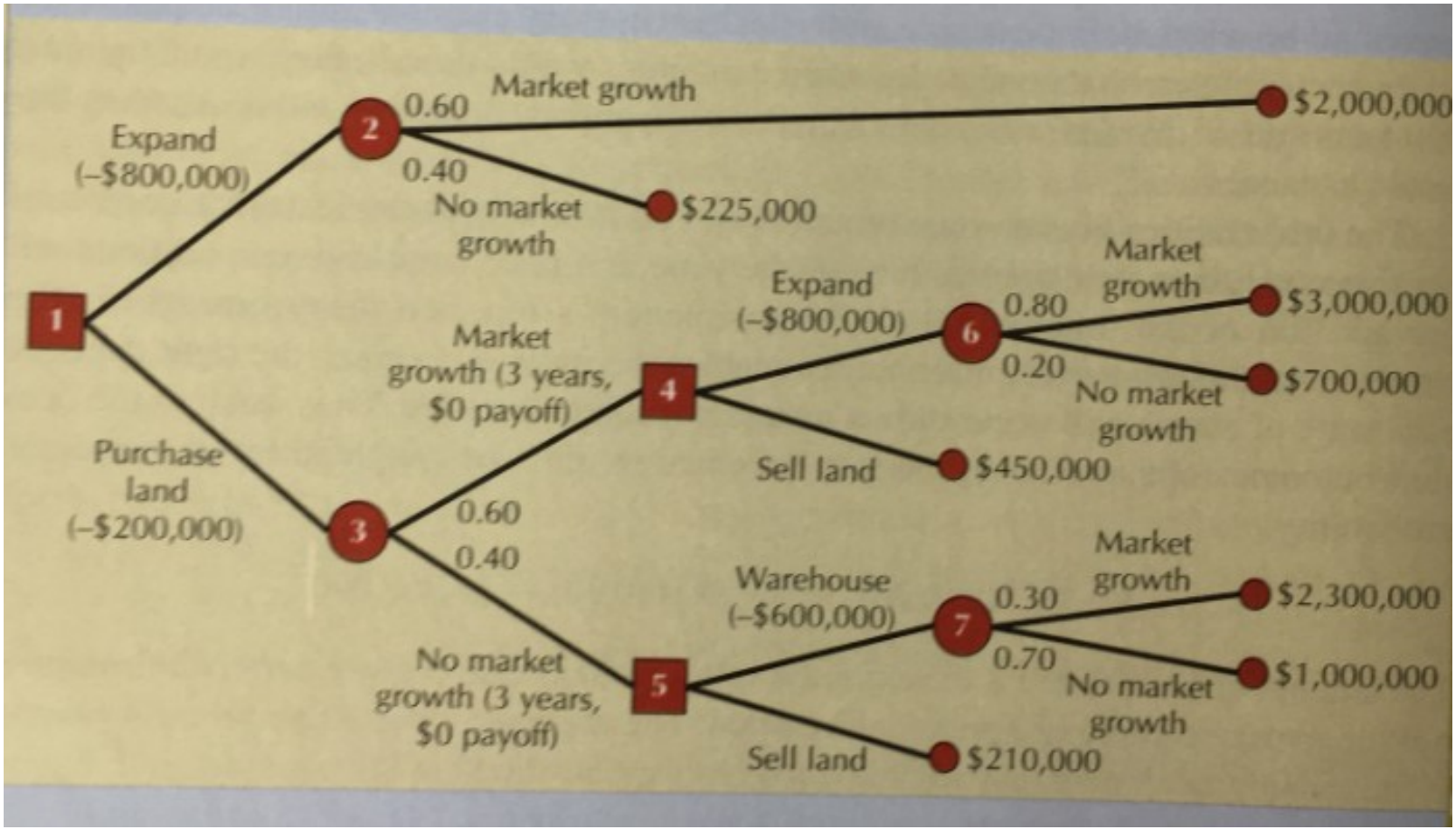
This means that you will not get 40 US each time !!

Because $EVA(x) = \sum p(xi)xi$ for=1 to n,

Where Xi = outcome i and p(xi) is a probability
of outcome i

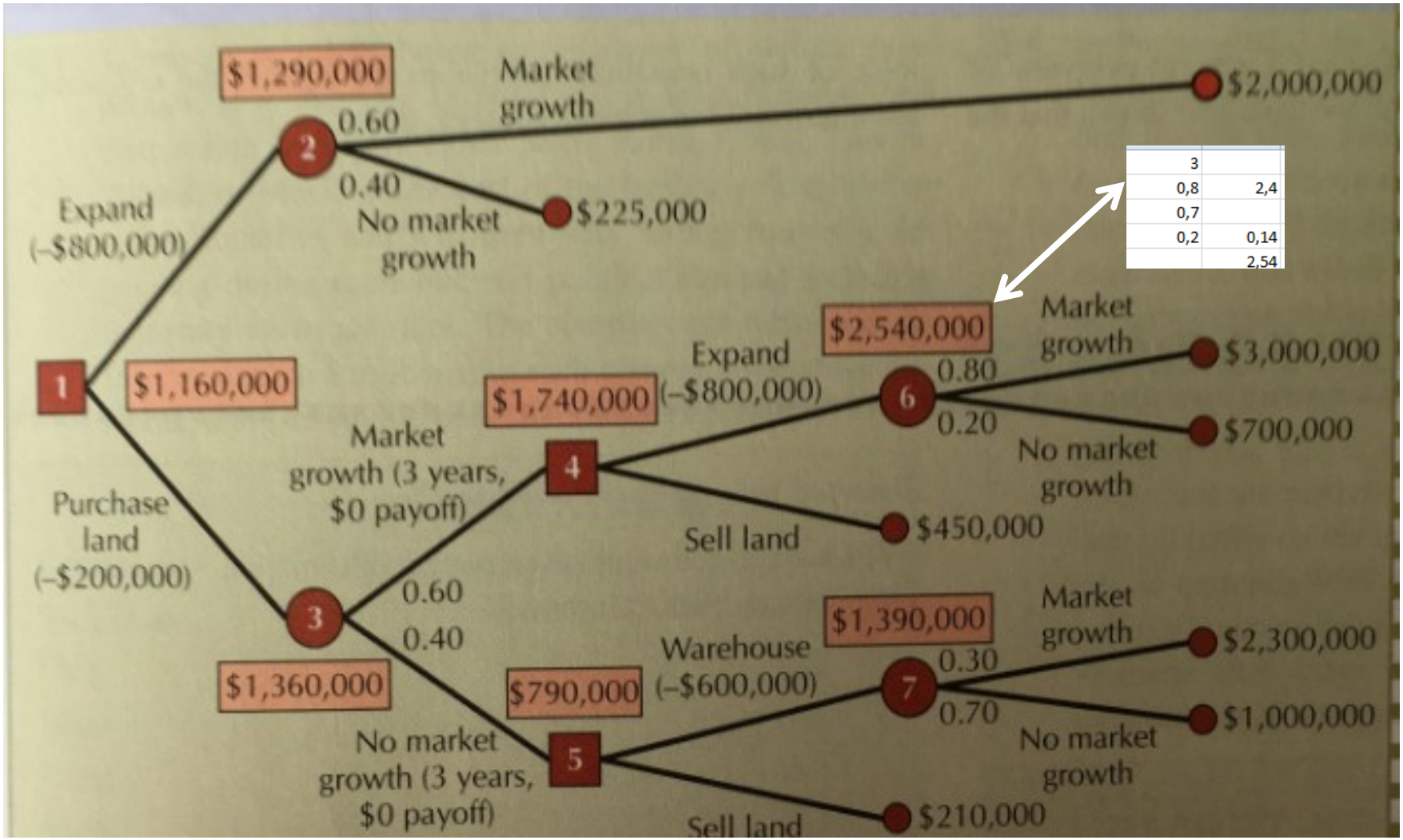
Resource: MBABullshit.com

DT-Example III



Resource: Russel and Taylor Operation management pages 66-67

DT-Example III



Decision tree calculation

Outcome	Probability	EVA	Expand
3 000 000,00	0,80		
700 000,00	0,20	2 540 000,00	
2 540 000,00		1 740 000,00	-800 000,00
1 740 000,00	0,60		
790 000,00	0,40	1 360 000,00	
1 360 000,00		1 160 000,00	-200 000,00
1 290 000,00		490 000,00	-800 000,00