**Question 1: What is the probability that a property worth at least $150000 in year 1 ends up worth $200000 or more in year 5?**

The probability of having a property of worth at least $150000 in 1st year and ends up with the property of worth $200000 or more in 5th year is 141/177 = ~80%

**Question 2: What is the probability that a property worth at least $150000 in year 1 ends up worth more than $279000 in year 5?**

The probability of having a property of worth at least $150000 in 1st year and ends up with the property of worth more than $279000 in 5th year is 105/177 = ~59%

1. **Describe and interpret what is going on in this tree in about 250 words:**

|  |  |  |  |
| --- | --- | --- | --- |
| ***Problem Set 9*** | **Dustin's research** | |  |
| **Biz** | positive (YR) | negative (NR) | MARGINAL PROB |
| Viable (YV) | P(YV&YR) | P(YV&NR) | P(YV) |
| Not viable (NV) | P(NV&YR) | P(NV&NR) | P(NV) |
| MARGINAL PROB | P(YR) | P(NR) | 1 |
|  |  |  |  |
| ***Values given in the story problem setup (fill in the blue cells, and the cell for X%):*** | | | |
|  | positive (YR) | negative (NR) | MARGINAL PROB |
| Viable (YV) | 35% | 23.60% | 59% |
| Not viable (NV) | 12.30% | 29% | 41% |
| MARGINAL PROB | 47.70% | 52.30% | 1 |
|  |  |  |  |
| P(YR|YV) = | 60% | P(NR|YV) = | 40% |
| P(YR|NV) = | 30% | P(NR|NV) = | 70% |
|  |  |  |  |
| **Conditional Probabilities:** |  |  |  |
| P(YV|YR) = | 74.21% | P(NV|YR) = | 26% |
| P(YV|NR) = | 45.12% | P(NV|NR) = | 54.88% |

By using the value of the 2nd question in the place of X = 59% we can calculate the above cells of conditional probabilities.

|  |  |
| --- | --- |
| Cost of research | ($16,000) |
|  |  |
| Cost of business | ($188,000) |
| Cost of refurb on purchase | ($60,000) |
| Total cost of purchase | ($248,000) |
|  |  |
| Potential payout | $500,000 |

These are the investments to purchase a property to get the estimated profits.

Let us build the tree by deciding of purchasing a property with research or with no research. If we go without researching about the property, there are two branches if the company interested in buying or not buying. If decided not to buy, then there is no profit or loss with no research. With no research and decided to buy, then it classified if it is viable or not viable. Let us consider its viable which means that the decision will work 59% and will not work like 41% which is not viable.

Now let’s look at the tree when a research is carried out there is 47.7% positive research and there is 52.3% negative research which means when the research is carried out there is a possibility of getting a feedback of positives which is 47.7% and negatives which is 52.3% about the property for us to make a decision to buy this property or not to buy. If you decided to buy, then next classification is if it is viable which has probability of doing research and getting positive and then buying the property which is viable that is 74.2%. On the other hand, not viable which has probability of doing research and getting positive and then not viable that is 25.8%. Let go back and decide not to buy the property after positive research then we will loss the money of the research. Now after researching if we get negative research then if we decide to buy the property then 45.1% that will work and 54.9% it will not work. Let us see if after negative research if we do not want to buy this, we will lose the money on research.

**What is the optimum strategy**: this is one of the highest expected value, in this tree the optimum strategy is the expected value is $47000, now we look the expected values of the events which are research and no research at research the expected value is $42704 and at no research the expected value is $47000. So, we chose the branch which has highest expected value which is no research. Then move to the next events which is buy or don’t but at buy the expected value is $47000 and don’t buy it is $0. So, we chose the buy branch which has highest expected value. Next there are two events which are viable and not viable if we consider viable it is $252,000 and at not viable it is negative $248000. So, we chose the viable which has highest expected value. So, the optimum strategy path is no research – buy – viable.

**What is expected value**: The expected value of a payoff distribution is calculated by multiplying each terminal value by its probability and summing the products.

**This is the tree that is drawn from the probabilities and values given in the question:**



**After changing value of B20 from 16000 to 10000** **and keeping the remaining values unchanged:** For this the optimum strategy is has changes from the original tree as the expected values also, the optimum strategy is doing research and then the research is positive and then decided to buy and then getting profits.



**After changing B22 from 188000 to 200000 and keeping the remaining values unchanged:** for this the optimum strategy is has also changed from the original tree as the expected values also, the optimum strategy is doing research and then the research is positive and then decided to buy and then getting profits.



**After changing B23 from 60,000 to 100000** **and keeping the remaining values unchanged** : for this the optimum strategy is has also changed from the original tree as the expected values also, the optimum strategy is doing research and then the research is positive and then decided to buy and then getting profits.



**After changing B26 from 500000 to 800000** **and keeping the remaining values unchanged:** This tree has the same optimum strategy as the original tree.

