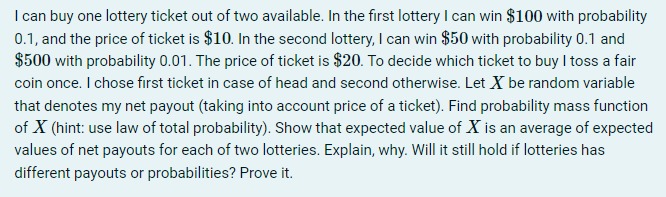
# Task 3



Let L1 and L2 be random variables that denote net payouts of the 1st and 2nd lotteries correspondingly.

|  |  |  |
| --- | --- | --- |
| L1 | 90 | 0 |
| P | 0.1 | 0.9 |

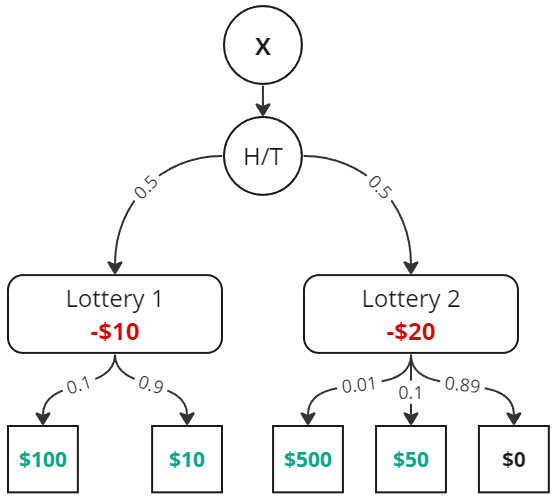
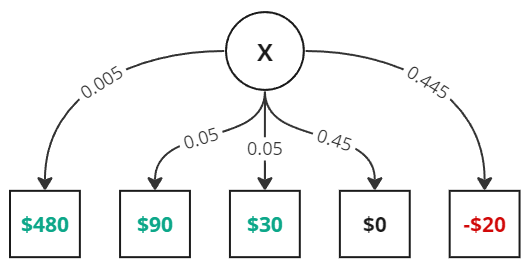
|  |  |  |  |
| --- | --- | --- | --- |
| L2 | 480 | 30 | -20 |
| P | 0.01 | 0.1 | 0.89 |

Probability mass function of X:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| X | 480 | 90 | 30 | 0 | -20 |
| P | 0.005 | 0.05 | 0.05 | 0.45 | 0.445 |

Hence, .

This can be explained by law of total probability and illustrated by following probability trees:



Now let’s prove, that for any probabilities and payouts in the lotteries.

Let take values with corresponding probabilities and take values with corresponding probabilities .

Then their expected values are:

,

.

By the law of total probability variable can have values with corresponding probabilities .

Then we can calculate it’s expected value:

.

We can group up some of the terms:

, q.e.d.