Determine the expected payoff of each deal and comment if we should take this deal if we still need to pay a premium of $100?

What if the price only increased from $1,100 to $1,125, instead of $1,200?

For the purposes of this assignment, we are going to assume there is no premium to be paid for this option. That way, the expected value will tell us the maximum premium price we would be willing to pay.

Then, if the price increases, we will call the option. If it decreases, we won't, since it's cheaper to buy them at the market price ($1,000), instead of the pre-determined price ($1,100).
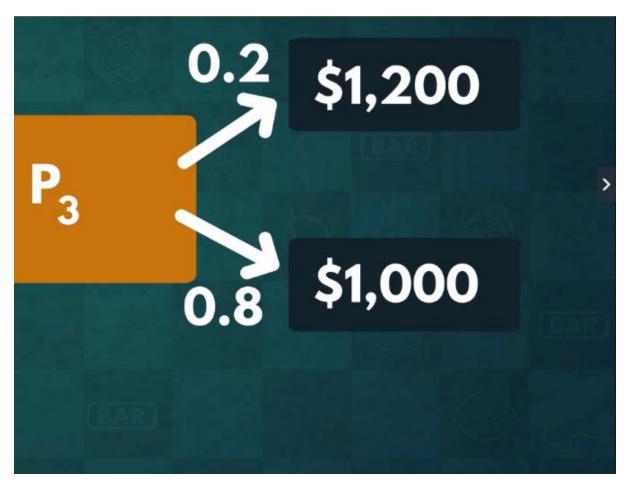
Therefore, we have a 0.4 chance of making a profit and 0.6 chance of not calling the option. Now, we need to find the profit associated with the first outcome. If the price increases from $1,100 to $1,125, then we be making a profit of $25 per stock. Since we wanted to get 10 of them, that would result in $250.

Thus, we have a 40% chance of making $250 and a 60% chance of ending up with $0. Hence,

$$E(P_2) = 0.4 \times 250 + 0.6 \times 0 = \$100$$

This means, that if we have to pay a premium lower than $100 for this deal, we should accept. If the premium is greater than $100, we should not take the deal. And, in cases like this one, if the premium is exactly $100, both choices are equally rational, so we can either accept or decline the deal.

What if the likelihood of a price drop increases to 80%?

The same methodology can be applied here.

From the video, we know that the payoff in the "increase" branch is equal to $1,000 ($100 for each of the 10 stocks).

Thus, we have a 20% chance of making $1,000 and an 80% chance of making $0. Hence,

$$E(P_3) = 0.2 \times 1,000 + 0.8 \times 0 = \$200$$

In this case, rational choice dictates we take any deal with a premium lower than $200 and reject any deal with a premium higher than $200.

Since the original premium for the deal is $100, we should take the deal.