MA1S02 Coursework 2 – The “Who want to take it or strike it castle maze” Challenge

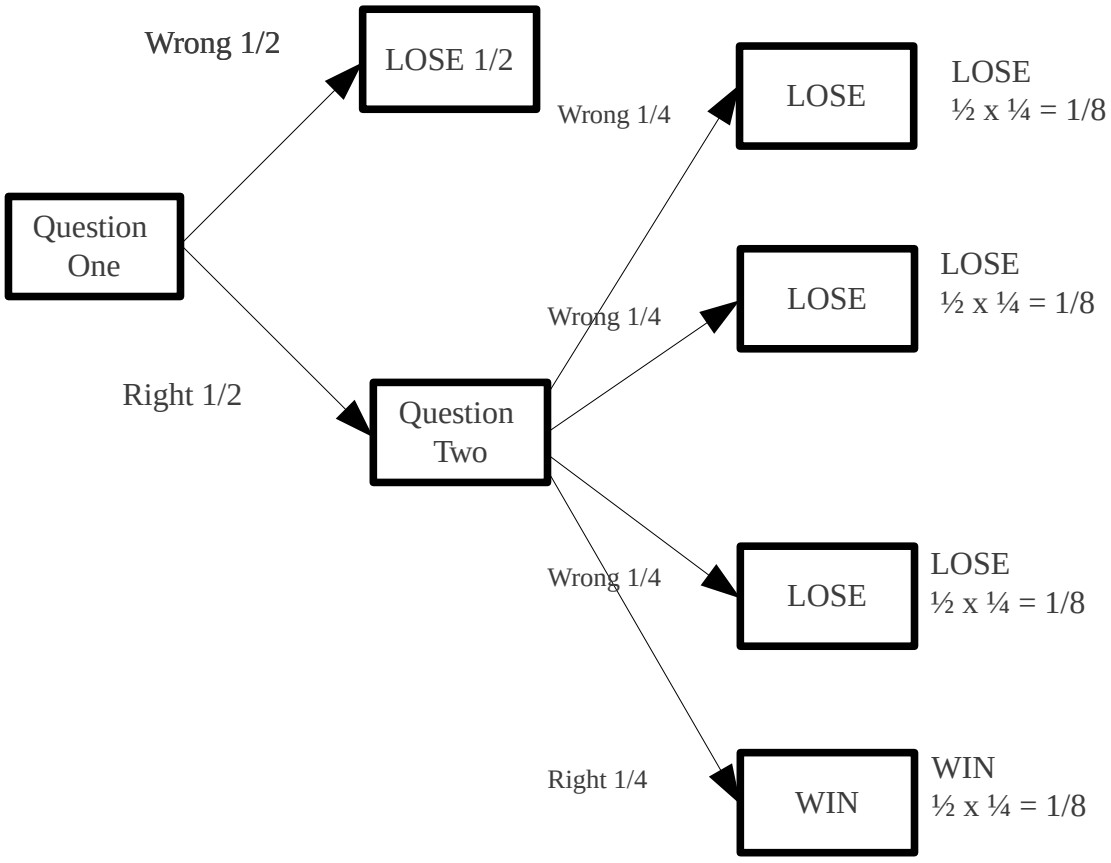
Peter Maynard

Coursework Brief

This coursework assumes that you have entered a fictional TV game show. You’ve entered because you want to win £20,000 in order for you to take your family on a holiday of a lifetime. Work through the following questions. You must give all of your working.

Question One

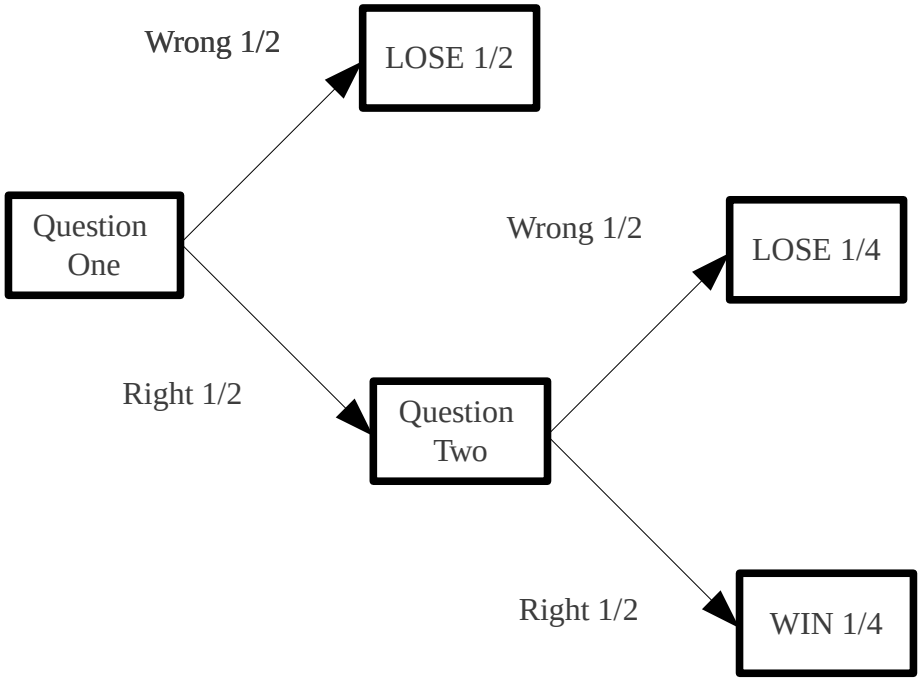
Question One with 50/50 for the first question.



The total probability of losing is (1/8 + 1/8 + 1/8 + 1/2) = 7/8 (0.875)

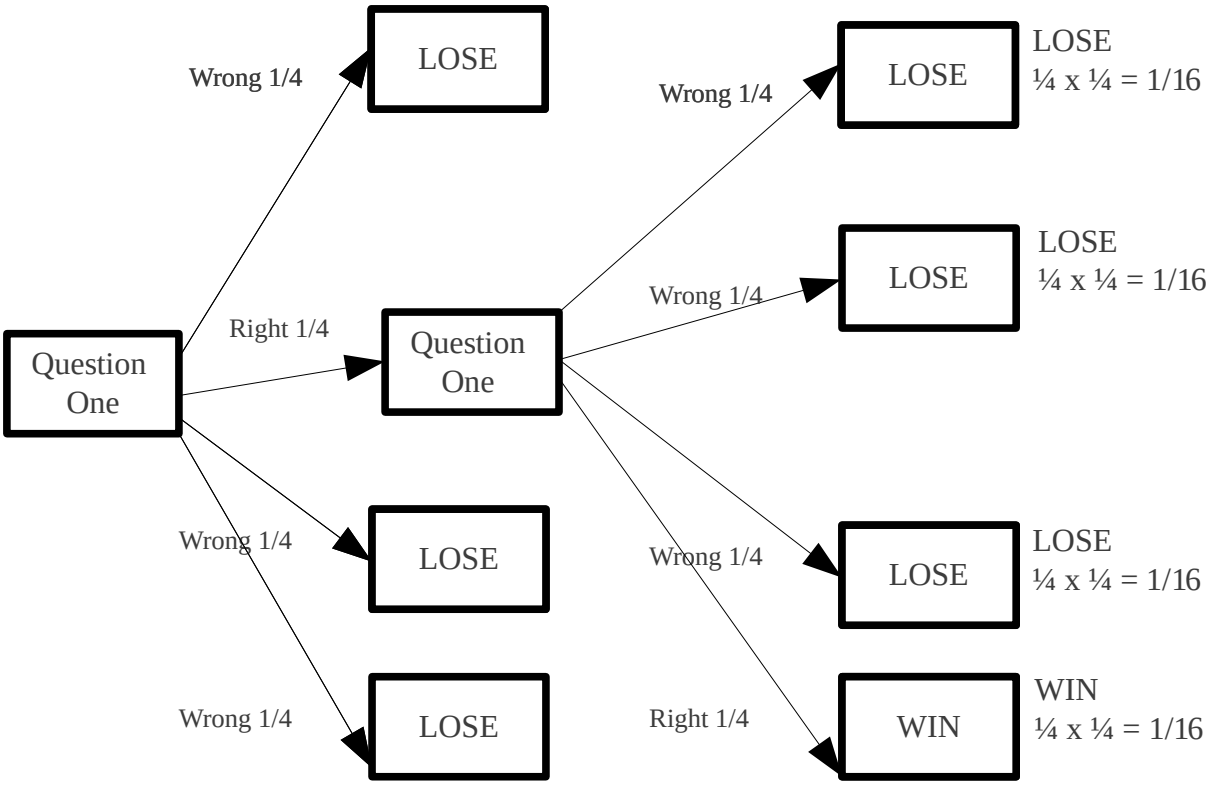
The probability of losing on the first question is 1/2 (0.5)
The probability of getting both right is (½ x ¼) = 1/8 (0.125)

Question One with 50/50 for the first and second question.



The total probability of losing is (½ + ¼) = 3/4 (0.75)
The probability of losing on the first question is 1/2 (0.5)
The probability of getting both right is (½ x ½) = 1/4 (0.25)

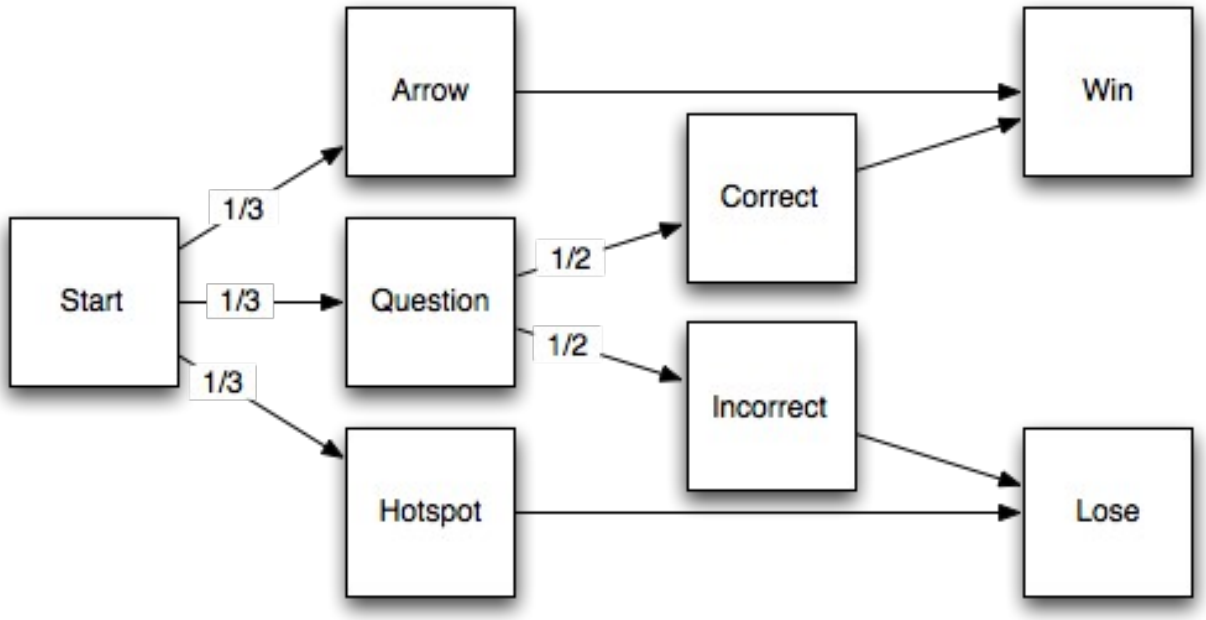
Question One with no 50/50 on any of the questions.



The total probability of losing is (1/16 + 1/16 + 1/16 + 1/4 + 1/4 + 1/4) = 15/16 (0.9375)
The probability of losing on the first question is 3/4 (0.75)
The probability of getting both right is (¼ x ¼) = 1/16 (0.0625)

Question Two

The below tree shows the probability of the stages.

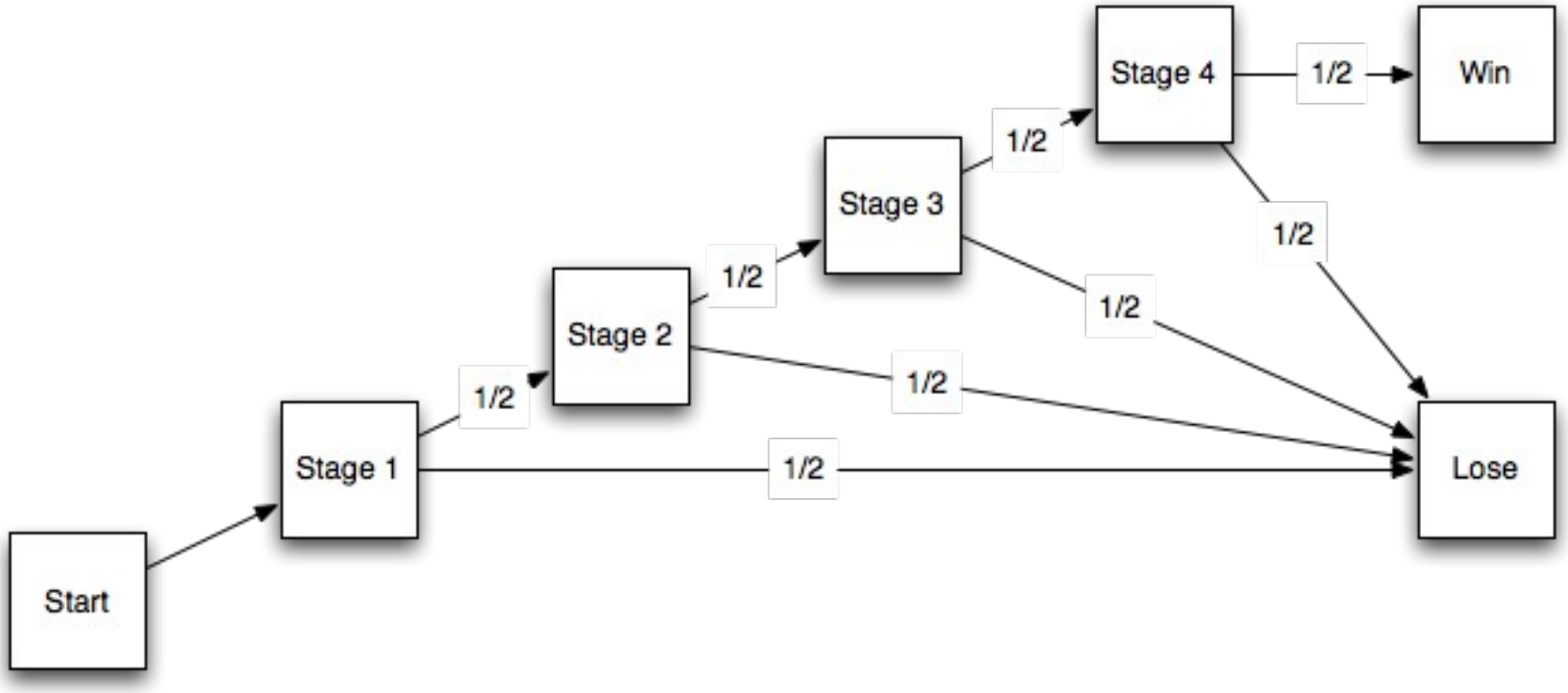


The probability of successfully proceeding to the next column is:

(1/3 + (1/3 x 1/2) = 1/6) = 1/2 (0.5)

The probability of failing the first stage is:

(1/3 + (1/3 x 1/2) = 1/6) = 1/2 (0.5)



The probability that you will be eliminated on the first stage is 1/2 (0.5)

The probability that you will be eliminated on the second stage is 1/2 x 1/2 = 1/4 (0.25)

The probability that you will be eliminated on the third stage is 1/2 x 1/2 x 1/2 = 1/8 (0.125)

The probability that you will be eliminated on the final stage is 1/2 x 1/2 x 1/2 x 1/2 = 1/16 (0.0625)

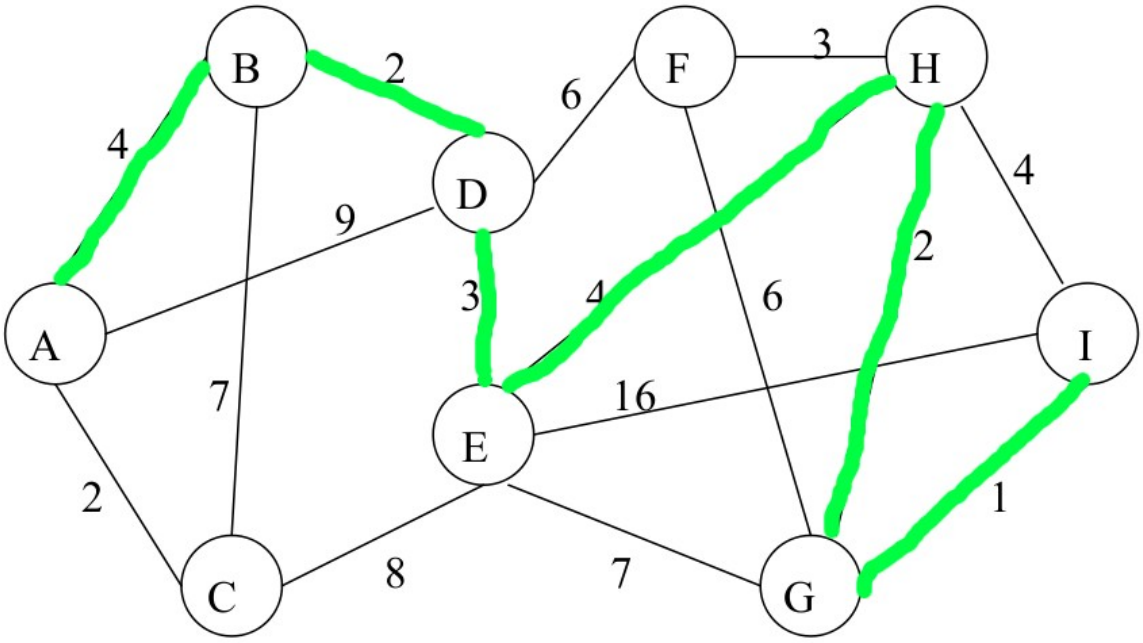
The probability that you will win and go through to the next stage is 1/2 x 1/2 x 1/2 x 1/2 = 1/16 (0.0625)

The probability that you will be eliminated before the third round is 1/2 x 1/2 x 1/2 = 1/8 (0.125)

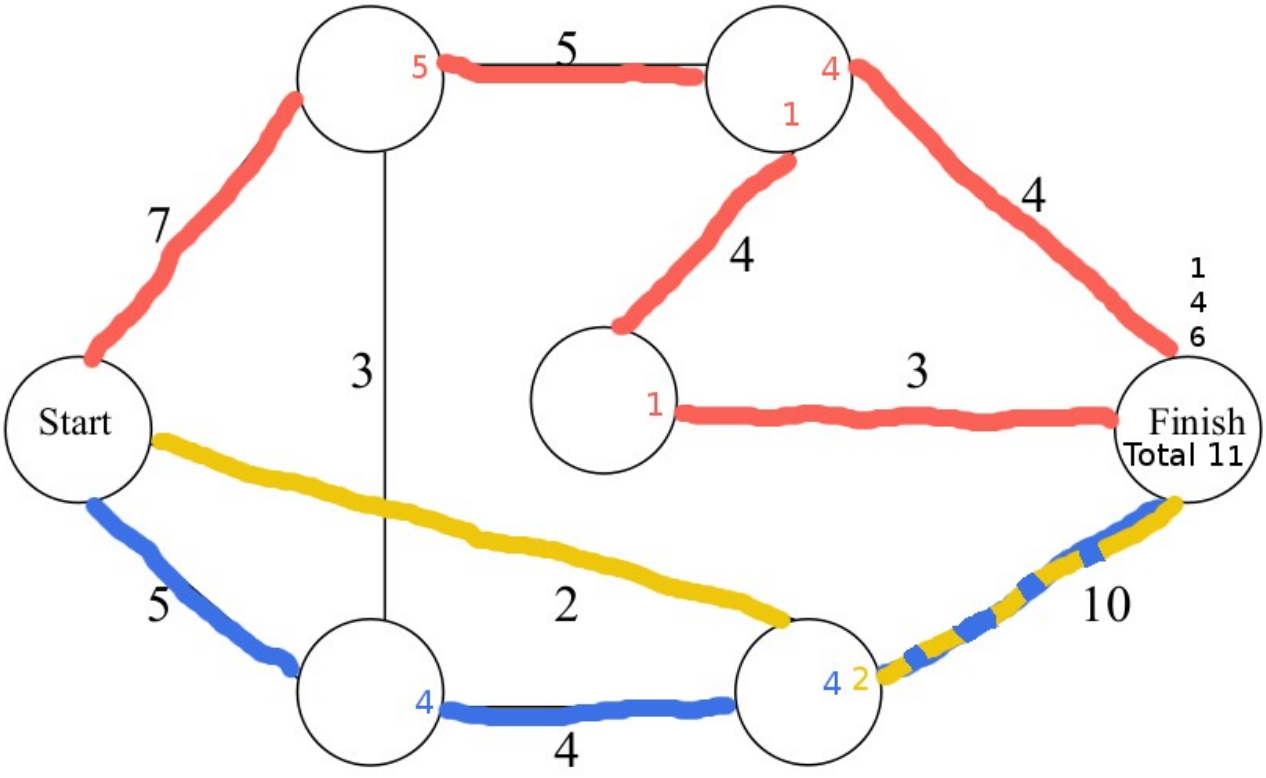
The probability that you will win by answering a question correctly on the last column is 1/2 x 1/2 x 1/2 x 1/6 = 1/24 (0.042)

Question Three

(a) The fastest way from the starting location A to the finish location I is A(4) – B(2), D(3), E(4), H(2), G(1) – I. Total 16



(b) The maximum water that can be pumped through the network of pipes is 11.



Question 4

(I) Minimax Criterion

If you gamble you have a 3/4 chance of gaining less than what you could have had. The Minimax says that you should not gamble.

(ii) Maximax Criterion

If you gamble and you win you could win £50,000. So you should gamble

(iii) Expected value Criterion

1*1/4+100*1/4+1000*1/4+50000*1/4 = 12775.25

Your expected out come would be £12,775.25. So it would be best not to gamble.

(iv) Regret Criterion

If you gamble and lose you would regret it because you would have lost £19,999 but if you didn't gamble you would have won £20,000. So you should not gamble.

Extra Question

276