Question 5 (25 marks)

(a) Two events A and B are such that $P(A) = \frac{3}{4}$ and $P(A \cap B) = \frac{1}{2}$.

(i) Find $P(B|A)$. Give your answer as a fraction in its simplest form.

(ii) $P(A \cup B) = \frac{11}{12}$. Investigate if the events A and B are independent.

Conclusion:

(b) A spinner consists of 4 segments, as shown.
Each segment is equally likely to be landed on.
Liam, Sorcha and Lee play a game in which the spinner
is spun twice and the numbers landed on are added together.
The result is divided by 3 and the remainder is recorded.
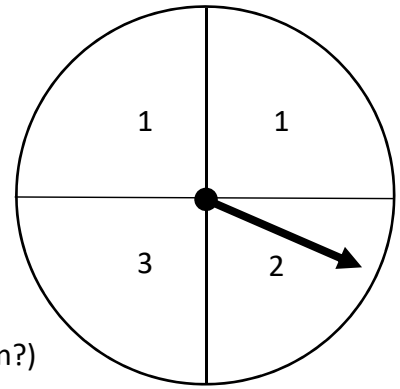
If the remainder is 0 then Liam wins the game.
If the remainder is 1 then Sorcha wins the game.
If the remainder is 2 then Lee wins the game.

Is this a fair game? (i.e. Are all 3 participants equally likely to win?)
Justify your answer by relevant calculations.

Fair Game (Yes / No):