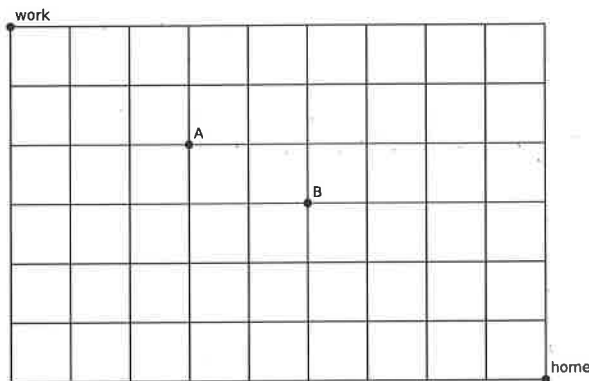


Quiz 4

Show all your work to receive full credit. Use the diagram to answer the questions



Consider the sample space $S = \{\text{shortest paths from work to home}\}$ and let E be the event "pass thru A" and F the event "pass thru B". (5 pts. each)

1. Find $Pr(E)$ and $Pr(F)$.

There are $\binom{15}{6} = 5005$ shortest paths from work to home. which 6 of the 15 moves are "south" moves (the other 9 are "east" moves). So $n(S) = 5005$. There are $\binom{5}{2} = 10$ shortest paths from work to A, and $\binom{10}{4} = 210$ shortest paths from A to home. So # paths thru A = $10 \times 210 = 2100$. Similarly, there are $\binom{8}{3} \times \binom{7}{3} = 56 \times 35 = 1960$ paths thru B. So $Pr(E) = 2100/5005 \approx 42\%$ and $Pr(F) = 1960/5005 \approx 39\%$.

2. Find $Pr(E \cap F)$ and $Pr(F|E)$.

There are $\binom{5}{2}$ paths from work to A, $\binom{3}{1}$ paths from A to B, and $\binom{7}{3}$ paths from B to home.

$$\text{So } Pr(E \cap F) = \frac{\binom{5}{2} \times \binom{3}{1} \times \binom{7}{3}}{5005} = \frac{10 \times 3 \times 35}{5005} = \frac{1050}{5005} \approx 21\%$$

$$\text{Finally, } Pr(F|E) = \frac{Pr(E \cap F)}{Pr(E)} = \frac{1050/5005}{2100/5005} = \frac{1050}{2100} = 50\%$$

TRUE OR FALSE? The events E and F are independent.

FALSE since $Pr(F) \neq Pr(F|E)$.