Finite Mathematics (Math 10120), Spring 2016

Quiz 2, Friday February 19

Solutions

1. (5 pts) On any given morning, the probability that I will sleep through my alarm clock is .7, the probability that I will **not** forget to eat breakfast is .6, and the probability that I will **both** sleep through my alarm **and** forget to eat breakfast is .4. What is the probability that I will **either** sleep through my alarm **or** forget to eat breakfast (or both)?

   Solution: Let S be the event that I sleep through my alarm clock and F the event that I will forget to eat breakfast.

   We are given $\mathbf{P}(S) = .7$ and $\mathbf{P}(F^c) = .6$, so $\mathbf{P}(F) = .4$. We are also given $\mathbf{P}(F \cap S) = .4$. So by inclusion-exclusion

   $$\mathbf{P}(F \cup S) = .7 + .4 - .4 = .7.$$

   So the probability that I will **either** sleep through my alarm **or** forget to eat breakfast (or both) is .7.

2. (5 pts) If I choose a path at random from A to B in the grid below, from among all paths that only go east or south, what is the probability that I pass through point C?
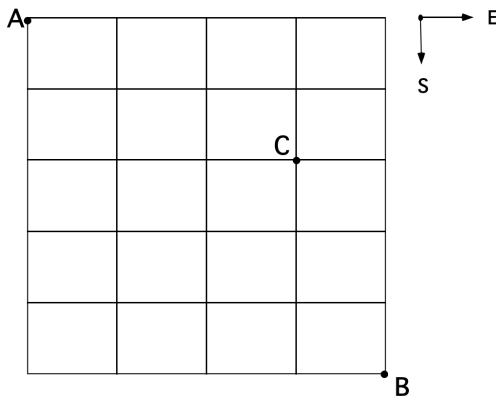
   (a) $1 - \frac{40}{26}$

   (b) 1

   (c) $\frac{10}{126}$

   (d) $\frac{40}{126}$

   (e) $\frac{14}{126}$

   Solution: There are $\binom{9}{4} = 126$ paths from A to B, of which $\binom{5}{2}\binom{4}{1} = 40$ pass through C. So the probability of passing through C is $40/126$, option (d).

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