Quiz #9 Solutions

Math 55 with Professor Stankova
Discussion Section #102 with GSI James Moody

Wednesday, the 26th of October 2016
Write your name at the top!

Question 1 [12 points] A professor packs her collection of 40 issues of a mathematics journal in four boxes with 10 issues per box. How many ways can she distribute the journals if the boxes are identical, so they cannot be distinguished [NOTE: The issues of the journal can be distinguished].

Let's label the journals 1,2,3,...,40. Let's first over-count, by counting the number of ways to put 10 issues each into four distinguishable boxes labeled A,B,C,D. To count this, we are counting strings of length 40 with letters A,B,C,D each repeated 10 ten times. This is the same as $\binom{40}{10} \cdot \binom{30}{10} \cdot \binom{20}{10} \cdot \binom{10}{10}$ (choose where to put the 10 A's, then where to put the 10 B's, then the 10 C's, then the 10 D's). This is also equal to $\frac{40!}{10! \cdot 10! \cdot 10! \cdot 10!}$.

Now, how much did we over count by? Well, we counted each distribution into the four boxes 4! times, (for each of the ways of labeling the boxes after distributing the books into them). So our final answer should be: $\frac{40!}{(10!)^4 \cdot 4!}$

Question 2 [±1 **point**] If E_1 and E_2 are disjoint events, then $p(E_1 \cup E_2) = p(E_1) + p(E_2)$.

True —or— False?

Question 3 [±1 **point**] Suppose you randomly choose an integer from $\{1, 2, ..., 100\}$. Suppose your friend also randomly chooses an integer from $\{1, 2, ..., 100\}$. What is the probability you chose the same number?

$\frac{1}{100^2}$ —— $\frac{1}{\binom{100}{2}}$ —— $\frac{100}{100^2}$ —— 0

Answer: $\frac{100}{100^2}$

Question 4 [±1 **point**] Suppose you randomly choose a card out of a 52 card deck. Then the probability your card is both an ace and a diamond is $\frac{1}{4} \cdot \frac{1}{13}$.

True —or— False?