APMA 1650 Homework 1 Common Mistakes

Rebecca Santorella

1. This was the problem where most students struggled. Please look at the solutions if you're still confused. On both parts, many students did not use words in their proofs. Proofs should inform the reader what is happening in complete sentences and justify any manipulations.

   (a) Two sets C and D are equal if and only if $C \subset D$ **and** $C \supset D$. The most common mistake here was to show $\subset$ but not $\supset$. A number of students also used the distributive laws to prove the distributive laws - this is circular logic!

   (b) There were no points taken off for this, but almost everyone used the trivial base case k=1. Note that for $k = 1$, this statement is trivial since it reads $A \cap B_1 = A \cap B_1$. Instead, use $k = 2$ as a base case and note that it was proved in (a) with $B_1 = B$ and $B_2 = C$. Many students also used what we were trying to prove as a step in their proofs.

2. Most students did well on this problem, but a few did not notice that the order of the rolls does not matter, i.e. that $P(\{(x, y)\}) = P(\{(y, x)\})$.

3. (a) There was a lot of confusion about how to interpret this problem, but this was clarified on Piazza. The question is asking for the probability of a heads occurring anywhere from the 10th to 20th toss.

   (b) Overall, this problem was fine.

   (c) Many people tried to do this problem by taking a binomial distribution and looking at the probability for $P(X \geq 2)$. This question is a bit more complicated than that since we are concerned with having at least 2 heads in a row, not just 2 heads.

4. Overall, this problem was fine.

5. A common mistake was that people forgot to take $\binom{100}{10}$ into account. Some students also confused a permutation and a combination.

6. Overall, this problem was fine.