Math 1001 Quiz 8 Solutions

1. (8 points, 2 points each) True or false.

   TRUE   An event is a list of possible outcomes from a random experiment.

   FALSE   A permutation is a way to choose items from a list without keeping track of order.

   TRUE   A probability is a number between 0 and 1 that represents how likely an outcome
   from a random experiment is.

   TRUE   A 4-to-1 chance of something happening is the same as a 20% probability of it happening.

2. (3 points) We have the following random experiment: We have a jar filled with black, red, and green marbles in some proportion. We stick our hand in the jar and pull out a marble at random. Write down the sample space for this experiment.

   The sample space is {black, red, green}.

3. (3 points) How many ways are there to choose 3 people out of 7 without keeping track of any order?

   The number of ways is $_7C_3 = 7 \times 6 \times 5/3 \times 2 \times 1 = 35$.

4. (3 points) I have a fair coin and I flip it 19 times in a row, and I get heads every time. What is the chance that on the 20th flip I get heads again?

   Since the coin is fair, the probability is $1/2$. Always!

5. (3 points) A deck of tarot cards has 4 suits of 14 cards each (swords, staves, cups, and coins) and 22 extra "trump" cards. What is the probability of not choosing a trump card?

   There are a total of $14 + 14 + 14 + 14 + 22 = 78$ cards, and of those 56 are not trumps, so the probability is $56/78$. If you want, you can simplify this to $28/39$ or about 72%.

6. (5 points) We have a special die where, instead of having having faces with the numbers 1 through 6, we have 1 face with the number 1 on it, 2 faces with the number 2 on them, and 3 faces with the number 3 on them. If we roll the die twice, what is the probability that numbers add up to 5?

   The only way the numbers can add up to 5 is if we get a 2, then a 3 or a 3, then a 2.

   The probability of getting 2 on any roll is $2/6 = 1/3$, and the probability of getting 3 on any roll is $3/6 = 1/2$. Since the rolls are independent, that means that the chance of getting 2, then 3 is $\frac{1}{3} \times \frac{1}{2} = \frac{1}{6}$, and the probability of getting 3, then 2 is also $\frac{1}{6}$, so the total probability is

   $$\frac{1}{6} + \frac{1}{6} = \frac{1}{3}.$$