EXAM 1: MORE COMPLETELY RANDOM PRACTICE PROBLEMS

1. Consider events A, E, F, and G, in a sample space S, such that

$$P(A) = 0.8, \qquad P(E) = 0.2, \qquad P(E \cup F) = 0.5, \qquad P(G) = 0.3, \qquad P(F|G) = 0.6.$$

(a) Find $P(A \cup G)$, assuming A and G are *independent.*

(b) Find $P(F)$, assuming E and F are *mutually exclusive.*

(c) Find $P(FG)$.

(d) Find $P(AFG)$, assuming A is independent from FG.

2. A database of trivia questions has easy, medium, and hard questions. Half (50%) of the questions are easy, 30% are medium, and 20% are hard. You have a 70% chance of answering an easy question correctly, a 50% chance of answering a medium one correctly, and 20% chance of answering a hard one correctly.

You pick a question at random from the database. You win the game if you answer that question correctly, and lose otherwise. What is the probability of winning?

3. A jar contains a combination of red, blue, and orange marbles, where some marbles are inscribed with the letter "W". Of the marbles in the jar, 2/5 are red marbles, 1/5 are blue marbles, and 2/5 are orange marbles. Also, 10% of the red marbles have a "W" on them. Similarly, 20% of the blue marbles have a "W", and 50% of the orange marbles have a "W".

You pick a marble at random from the jar. What is the probability that the marble has a "W" inscribed on it?

4. 18 socks total lie mixed up in a drawer: 8 blue socks, 4 red socks, 1 yellow sock, and 5 green socks. You grab two socks at random without looking. Find the probability that:

(a) Both socks are blue.

(b) Both socks are red.

(c) Both socks are green.

(d) Both socks have the same color.

5. What's the probability that, of the 27 people in this class (including Dr. Slam), at least two share a birthday? (Assume that there are no February 29 birthdays, and that all other birthdays are equally likely.)

6. You watch 10 pairs of socks, each pair a different color from the other pairs, and after washing, 6 socks are lost. Which is more likely: (a) the best case scenario (where the 6 lost were all in pairs, so 7 pairs remain intact), or (b) the worst case scenario (where all 6 lost socks are of different colors, so only 4 intact pairs remain)?