Sample Exam

Note: This exam is a sample, and intended to be of approximately the same length and style as the actual exam. However, it is NOT guaranteed to match the content or coverage of the actual exam. DO NOT use this as your primary study tool!

Full Name: _____

On my honor, I have neither given nor received unauthorized aid on this examination.

Signature: _____

This is a 50 minute exam. There are 4 problems, worth a total of 40 points. **Remember to show your work.** Answers lacking adequate justification may not receive full credit. You may use one letter-sized sheet (the same size as the lecture notes) of your own notes and a pocket calculator. (You are not required to bring a calculator — you may leave your answers in a form from which the numerical answer could be immediately calculated.) You may *not* use any books, other references, or text-capable electronic devices.

1. The population of Cyprus is 70% Greek and 30% Turkish. Twenty percent of the Greeks and 10% of the Turks speak English.

   (a) What is the probability that a randomly chosen Cypriot speaks English?   [5 pts]
   (b) You randomly meet an English-speaking Cypriot. What is the probability that this person is Turkish?   [5 pts]

2. An automated phone call routing system serves three offices, numbered **1**, **2**, and **3**. Three phone calls come in, one intended for each of the three offices. Unfortunately, the phone system is malfunctioning — it assigns one call to each office, but in a random order. Assume all such assignments are equally likely.

   (a) Define labels for the outcomes of this experiment. Using these labels for sample points, list the sample space.   [4 pts]
   (b) Define the events

   $$A = \{\text{office } \mathbf{1} \text{ receives its correct call}\}$$
   $$B = \{\text{office } \mathbf{3} \text{ receives its correct call}\}$$
   $$C = \{\text{no office receives its correct call}\}$$

   List A, B, and C in terms of the sample space defined above. Which pairs of these events are disjoint?   [4 pts]
   (c) Are A and B independent events? Why or why not? (Show your work.)   [2 pts]

3. Five applicants (Jim, Don, Mary, Sue and Nancy) are available for two identical jobs. Because all applicants are equally qualified, the supervisor randomly selects two applicants to fill these jobs. Find the probability of each of the following events.

(a) Both males are selected.   [5 pts]

(b) Atleast one male is selected.   [5 pts]

4. According to the U.S. Census Bureau, the 2005 poverty rate for households with female heads (no husbands present) and children under age 6 was 40%; it was 25% for households with male heads (no wife present) and children under 6; and it was 8% for married-couple homes with children under 6. For households with children under 6, 20% have female heads, 8% have male heads, and 72% are married-couple homes.

(a) Using the law of total probability, find the probability that a randomly selected household with a child under 6 lived in poverty in 2005.   [5 pts]

(b) Using the Bayes rule, find the probability that a randomly selected household with a child under 6 comes from a married-couple home, given that the household lived in poverty in 2005.   [5 pts]