Math 105: Finite Mathematics

Homework 4: Due Feb 19, 2008

February 12, 2008

Remember, show your work for full credit on all problems.

1 Counting with Factorials

1.1

Seven doctors meet in a conference room, each of whom shakes the hand of all other doctors there exactly once. How many total handshakes occurred?

1.2

On an exam, students are given their choice to answer seven out of ten questions. How many possible exams could be taken? If the exam is further restricted so that a student must answer at least three of the first 5 questions, how many possible exams are there now?

1.3

For each of the words listed below, 1) count the number of permutations possible when selecting four letters, and 2) count the number of combinations possible when selecting four letters.

- PEPPER

- MISSISSIPPI

- BEEKEEPER

- FLUX

1.4

Beyond the First-Year Experience, Centenary's core curriculum requirements are as follows:

- The humanities requirement, where students critically analyze and evaluate human artistic and cultural accomplishments. Students mayand are encouraged totake up to three hours in fulfillment of this requirement in courses that teach aesthetic appreciation through performance or production. 4 courses (at least 12 hours) in at least two departments or schools, with at least one course at or above the 300 level.

- The mathematics requirement, in which students develop a facility in and appreciation for symbolic reasoning. 1 course (min. 3 hours).

- The natural sciences requirement, through which students explore the nature of the material universe. 2 courses (8 hours) that include laboratory experience

- The social sciences requirement, in which students examine human behavior through the systematic analysis of data. 3 courses, in at least two departments or schools, with at least one course at or above the 300 level (minimum of 9 hours).

Use the lists of courses which qualify for core to find how many different ways there are to fulfill the Centenary core requirements in mathematics, natural sciences and social sciences.

- http://www.centenary.edu/catalogue/require/core/math

- http://www.centenary.edu/catalogue/require/core/natural

- http://www.centenary.edu/catalogue/require/core/social

For 9 points of extra credit, include the humanities requirements in your calculations.

- http://www.centenary.edu/catalogue/require/core/humanities

2 Recalibration

2.1

What is the result of the following expressions?

2.1.1

12 % 5

2.1.2

15 % 21

2.1.3

4 % 2

2.1.4

7 % 7

2.2

We can simulate having a weighted coin using a six-sided die by relabeling 1 and 2 as Heads and relabeling 3, 4, 5 and 6 as Tails.

2.2.1

What is the probability of Heads under this labeling?

2.2.2

Roll a die 5 times, record your die rolls as described above, and use the calibration discussed in class and Chapter 6 to determine if the cumulative result should be recorded as Heads or Tails. Repeat this experiment 4 times.

2.2.3

What is the expected probability of rolling Heads when the 5-roll calibration is used?

2.3

We can also create a weighted five-sided die by counting both 5 and 6 as if they were a 5.

2.3.1

Roll a die 3 times, and sum the resulting numbers as S, then calculate $(S \ \% \ 5) + 1$ to determine the calibrated outcome. Repeat this experiment 4 times.

2.3.2

What is the expected probability of rolling a 2 when this 3-roll calibration is used?