MA162: Finite mathematics

Jack Schmidt

University of Kentucky

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SCHEDULE:

- HW 7C due Fri, April 27, 2012
- Final exam, Wed May 2, 2012 from 8:30pm to 10:30pm

Today we will review the practice exam.

Final Exam Breakdown

- Chapter 7: Probability
    - Counting based probability
    - Counting based probability
    - Empirical probability
    - Conditional probability

- Cumulative
    - Ch 2: Setting up and reading the answer from a linear system
    - Ch 3: Graphically solving a 2 variable LPP
    - Ch 4: Setting up a multi-var LPP
    - Ch 4: Reading and interpreting answer form a multi-var LPP

Ch 2 setup

- Joe Farmer has 100 acres of arable land. He has the decision narrowed down to planting corn, planting soy, and leaving it fallow. He has about 80 tons of nitrogen fertilizer, and 1300 hours of labor available. How much of each crop (corn and soy) should he plant in order to use up the fertilizer and the labor?

	Corn	Soy	Fallow	Total
Fertilizer	1.5 tons per acre	0.5 tons per acre	0 tons per acre	80 tons
Labor	20 hours per acre	30 hours per acre	0 hours per acre	1300 hours

- Variables, Equations, Matrix

Ch 3: Just do it

- A farmer has 150 acres of land suitable for cultivating Crops A and B, but is constrained by fertilizer costs, labor availablility, and carbon dioxide. He cannot use more than $7400 in fertilizer, more than 3300 hours of labor, or 3 billion tons of carbon dioxide. Cost per acre is giving in the following table:

	Crop A	Crop B	Available
Fertilizer	$40 per acre	$60 per acre	$7400
Labor	20 hrs per acre	25 hrs per acre	3300 hours
Carbon Dioxide	7 tons per acre	8 tons per acre	3 billion tons
Profit	$150 per acre	$200 per acre	

- How much of each crop should he plant? [Show your work and answer clearly and completely.]

Ch 2/4: Read it

- Vincent is trying to optimize his profit by solving a system of linear equations.

$$\begin{pmatrix}
X & Y & A & B & C & D & P & rhs \\
\hline
1 & 0 & 0 & 0 & 3/2 & -1/2 & 0 & 3 \\
0 & 1 & 0 & 0 & -1/2 & 1/2 & 0 & 7 \\
0 & 0 & 1 & 0 & -4 & 1 & 0 & 9 \\
0 & 0 & 0 & 1 & -7/2 & 1/2 & 0 & 3 \\
\hline
0 & 0 & 0 & 0 & 9 & 1 & 1 & 114
\end{pmatrix}$$

- Which variables are free?

- Convert the last row to an equation, and solve it for the non-free variable.

- What value should the free variables have to maximize P? (assuming they cannot be negative)

- Solve the third row for a non-free variable, and replace the free variables by their values from part (c).

Ch 7: Counting probability

- Two fair dice are rolled.

- What is the probability that the first die is odd?

- What is the probability that the total roll is 8 or larger?

- What is the probability that both the total roll is 8 or larger and the first die rolled was odd?

- What is the probability that the total roll is 8 or larger given that the first die rolled was odd?

- Are the events "total roll is 8 or larger" and "the first die is odd" independent, mutually exclusive, both, or neither?

Ch 7: Counting probability

- A survey of 100 College students were asked for their opinions about pizza. They were specifically whether they liked pepperoni, mushrooms, and garlic.

  - 51 students liked pepperoni.
  - 49 students liked mushrooms.
  - 47 students liked garlic.
  - 23 students liked both pepperoni and mushrooms.
  - 22 students liked both pepperoni and garlic.
  - 21 students liked both mushrooms and garlic.
  - 10 students liked all three toppings.

- What is the probability that a random student did not like any of the toppings?

- What is the probability that a random student liked at least two of the toppings?

Ch 7: Conditional probability

- You are examining a budget cut proposal. In the cut, 85 out of 340 managers will be laid off. A total of 230 out of 940 employees will be laid off, including the managers.

- What is the probability a random employee will be laid off?

- What is the probability a random non-manager will be laid off?

- What is the probability an employee that gets laid off is a manager?

- Are the events "getting laid off" and "being a manager" independent?

Ch 7: Counting probability

- A fashionable octopus is red-green color blind, but likes to wear bracelets. She has 10 red bracelets and 6 green bracelets. Since she cannot tell the difference between them, she picks bracelets at random each morning and hopes for the best.

- What is the probability that she puts on a matching octuplet of bracelets?

- What if she goes minimalist and only wears 2 bracelets. What is the probability the pair matches?

- Her non-conformist friend Crabetta the crab wears three pairs of shoes at a time. Sometimes she is very rushed in the morning, and just throws on shoes (left shoes on left feet, right shoes on right feet, but her closet is so dark and such a mess, that's all she can do). What is the probability that none of her shoes matches if she owns 10 pairs of shoes?