MA162: Finite mathematics

Jack Schmidt

University of Kentucky

February 6, 2012

SCHEDULE:

- Exam 1 is Monday, Feb 6th.

Sec 001-006:	5:00pm-7:00pm in CB106
Sec 007-012:	5:00pm-7:00pm in CB118
Alternate:	3:00pm-5:00pm in CP153
Late:	6:00pm-8:00pm in CB122

Today we will review the practice exam.

A courier travels from city Ashton with coordinates $(0,0)$ to city Cranston with coordinates $(125, 135)$. He must pass through **exactly one of the cities** Brady with coordinates $(72, 45)$ or Dalton $(45, 72)$ along the way. Assume he travels a straight line between cities.

Which city should he pass through (Brady or Dalton) in order to minimize his trip distance from Ashton to Cranston, and how far does he end up travelling?

Point A has coordinates $(7, 3)$, and point B has coordinates $(0, 5)$. What is the distance from A to B and what is the slope of the line joining A to B?

Suppose that the point C with coordinates $(x, 9)$ is such that the triangle ABC is a right triangle with right angle at B. Determine the value of x.

The Flörgerstrøm company makes valve cleaning units for flügelhorns. The cost function for their manufacturing line is $C = 2x + 3500$, where x is the number of VCUs produced per month and C is measured in dollars. The company expects \$7 in revenue per unit.

Determine the linear profit function for the Flörgerstrøm company in the usual form $P = mx + b$, assuming they can sell all the units they manufacture.

Determine the break-even value for x and the break-even cost C at that value for x.

In a free market, the supply equation for a supplier of corn is $x = 36p + 200$ where the price p is in dollars and x is in bushels. When the price is 4 per bushel the demand is 1170 bushels. When the price goes up to 17 per bushel the demand drops to 0 bushels. Assuming that the demand equation is also linear, find the equilibrium price and the number of bushels supplied at that equilibrium price.

Mr. Marjoram is renting an automated stuffed animal factory with three machines: a sewing machine, a stuffing machine, and a trimming machine. He has programmed it to make Pandas, Dogs, and Birds, but some of the animals take longer on some of the machines, so he isn't sure how many of each animal to make. He wants the machines to be in constant use (so he feels he got his money's worth; why pay for an idle machine). The production times and available times are given in the table below. How many of each animal should he make?

	Sewing	Stuffing	Trimming
Panda	12 min per	13 min per	14 min per
Dog	16 min per	17 min per	15 min per
Bird	20 min per	18 min per	19 min per
Available	12 hours	12 hours	12 hours

- Define the variables, and given the equations and the augmented matrix

Here is the augmented matrix of a linear system of equations. Take this matrix to RREF. Be sure to label your reduction operations in standard notation. You need not solve for the variables.

$$\left(\begin{array}{cccc|c}
x & y & z & w & \text{RHS} \\
\hline
7 & 6 & 5 & 4 & 3 \\
0 & 3 & 4 & 5 & 6 \\
0 & 0 & 1 & 2 & 3
\end{array}\right)$$

Practice exam #7

Here is the augmented matrix of a linear system of equations. As usual, the variables are mentioned for your convenience.

$$\left(\begin{array}{cccc|c} x & y & z & w & \text{RHS} \\ \hline 1 & 2 & 0 & 0 & 3 \\ 0 & 0 & 1 & 0 & 4 \\ 0 & 0 & 0 & 1 & 5 \end{array}\right)$$

Is this matrix in REF or RREF or neither of these?

Finish the solution process as needed and determine the complete solution of the system by filling in the answers below. If a variable is free, then enter the word "free" as its value. Be sure to show all calculations.

- Solve for P, D, B in this REF matrix:

$$\left[\begin{array}{ccc|c} P & D & B & RHS \\ 3 & 4 & 5 & 180 \\ 0 & 1 & 11 & 180 \\ 0 & 0 & 1 & 15 \end{array}\right]$$

Does this actually work in #5 (will the machines actually remain busy)?

Solve for P, D, B in this other REF:

$$\left[\begin{array}{ccc|c} P & D & B & RHS \\ 14 & 15 & 19 & 720 \\ 0 & 11 & 13 & 360 \\ 0 & 0 & 1 & 15 \end{array}\right]$$

- A farmer is in the corn and soy business. Every acre of corn will cost him $40 and every acre of soy will cost him $32. He has 100 acres and a budget of $3,480. How much should he plant of each crop in order to use up all the land and all the budget?

He should plant _____ acres of corn
and _____ acres of soy.

This will use _____ acres of land
and $_____ from the budget.