

# MA162: Finite mathematics

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## SCHEDULE:

- HW 2.5-2.6, 3.1-3.3, 4.1 (Late)
- Exam 2, Monday, Mar 04, 2013, from 5pm to 7pm
- HW 5.1 due Friday, Mar 08, 2013
- Spring Break, Mar 09-17, 2013
- HW 5.2-5.3 due Friday, Mar 22, 2013

Today we will cover the practice exam.

## PE#1: Arithmetic

- Show your work. Answers without justification receive no credit.

- Add  $[1 \ 2 \ 3] + [40 \ 50 \ 60]$

- Multiply  $[1 \ 2 \ 3] \times [40 \ 50 \ 60]$

- Add  $[1 \ 2 \ 3] + \begin{bmatrix} 40 \\ 50 \\ 60 \end{bmatrix}$

- Multiply  $[1 \ 2 \ 3] \times \begin{bmatrix} 40 \\ 50 \\ 60 \end{bmatrix}$

- Multiply  $\begin{bmatrix} 40 \\ 50 \\ 60 \end{bmatrix} \times [1 \ 2 \ 3]$

- Find the inverse of  $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 4 \\ 0 & 0 & 1 \end{bmatrix}$ .

## PE#2: Ch 3 basic skills pt 1

- Show your work. Answers without justification receive no credit.
- Is  $(x = 3, y = 1)$  on the correct side of  $20x + 40y \leq 10$ ? Explain why or why not.
- Is  $(x = 3, y = 1)$  a feasible solution to  
  
“maximize  $P = 1.50x + 2.00y$  subject to  $3x + 2y \leq 15$ ,  
 $2x + 3y \leq 12$ ,  $x \geq 0$ ,  $y \geq 0$ ”?
- Is it optimal? Explain why or why not.
- What are the corners of the feasible region described by  
 $3x + 2y \leq 15$ ,  $2x + 3y \leq 12$ ,  $x \geq 0$ ,  $y \geq 0$ ? Make sure to show at least one full calculation.

## PE#3: Ch 4 basic skills pt 1

- Show your work. Answers without justification receive no credit.

Refer to this simplex tableau:

$$\left( \begin{array}{cccc|cccc|c|c} x & y & z & a & b & c & d & P & RHS & \\ \hline -5 & 0 & 3 & 0 & 2 & 1 & 0 & 0 & 33 & \\ 4 & 1 & 2 & 0 & 3 & 0 & 0 & 0 & 21 & \\ 3 & 0 & 1 & 1 & 4 & 0 & 0 & 0 & 10 & \\ 2 & 0 & 0 & 0 & 5 & 0 & 1 & 0 & 44 & \\ \hline 1 & 0 & -1 & 0 & -6 & 0 & 0 & 1 & 55 & \end{array} \right)$$

- What is the basic solution indicated by this simplex tableau?
- Explain why it is feasible.
- Explain why it is not optimal.
- Which columns in this simplex tableau are eligible for pivoting?
- What happens if you pivot on a wrong column?
- Assuming we pivot the third column, which rows are eligible for pivoting?
- What happens if you pivot on a wrong row?

## PE#4: Ch 4 Basic Skills pt 2

- Show your work. Answers without justification receive no credit.
- Do the row ops to pivot on the 3rd column, 3rd row, even if this is not the right row or column.

$$\left( \begin{array}{cccc|cccc|c|c} x & y & z & a & b & c & d & P & \text{RHS} \\ \hline -5 & 0 & 3 & 0 & 2 & 1 & 0 & 0 & 33 \\ 4 & 1 & 2 & 0 & 3 & 0 & 0 & 0 & 21 \\ 3 & 0 & 1 & 1 & 4 & 0 & 0 & 0 & 10 \\ 2 & 0 & 0 & 0 & 5 & 0 & 1 & 0 & 44 \\ \hline 1 & 0 & -1 & 0 & -6 & 0 & 0 & 1 & 55 \end{array} \right)$$

## PE#5: Ch 3 Basic Skills pt 2

- Show your work. Answers without justification receive no credit.
  
- Maximize  $P = 1.50x + 2.00y$  subject to  $5x + y \leq 40$ ,  $x + y \leq 10$ ,  $x + 5y \leq 30$ ,  $x \geq 0$ ,  $y \geq 0$  Make sure to (1) shade the region, (2) label the corners, (3) label where the maximum occurs and how big it is, and (4) why it must be the maximum.

## PE#6: Ch 3 Full Problem

- Show your work. Answers without justification receive no credit.
- A company makes two products. The products require spending four resources that are limited by a budget. There is a minimum and maximum amount of each product that must and can be produced (some people have already pre-ordered each product, and there is a limited demand). Each product earns a certain amount of revenue.

	Usage				Demand		Revenue
	Resource 1	Resource 2	Resource 3	Resource 4	Minimum	Maximum	
Product 1	7	10	3	2	3	40	\$0.50
Product 2	7	5	6	2	9	40	\$1.05
Budget	350	405	255	500			

- Give a recommendation to maximize revenue while using only the limited resources, meeting the minimum demand, and not producing more than the maximum demand

## PE#7: Ch 4 Full Problem

- Show your work. Answers without justification receive no credit.
- A company makes 3 products using 5 limited resources. The resource usage and revenue for each product and the budget for each resource are given in the following table.

	Resource 1	Resource 2	Resource 3	Resource 4	Resource 5	Revenue
Product 1	7	10	3	2	8	\$0.75
Product 2	7	5	6	2	5	\$1.05
Product 3	7	8	9	20	6	\$1.50
Budget	350	405	255	500	320	

- How much of each product should the company make to maximize revenue while remaining under budget?

You may find the following RREF calculation useful:

$$\left[ \begin{array}{cccccccc|c} 7 & 7 & 7 & 1 & 0 & 0 & 0 & 0 & 350 \\ 10 & 5 & 8 & 0 & 1 & 0 & 0 & 0 & 405 \\ 3 & 6 & 9 & 0 & 0 & 1 & 0 & 0 & 255 \\ 2 & 2 & 20 & 0 & 0 & 0 & 1 & 0 & 500 \\ 8 & 5 & 6 & 0 & 0 & 0 & 0 & 1 & 320 \\ -0.75 & -1.05 & -1.50 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{array} \right] \rightarrow \left[ \begin{array}{cccccccc|c} 1 & 0 & -1 & \frac{2}{7} & 0 & -\frac{1}{3} & 0 & 0 & 0 & 15 \\ 0 & 0 & 8 & -\frac{15}{7} & 1 & \frac{5}{3} & 0 & 0 & 0 & 80 \\ 0 & 1 & 2 & -\frac{1}{7} & 0 & \frac{1}{3} & 0 & 0 & 0 & 35 \\ 0 & 0 & 18 & -\frac{2}{7} & 0 & 0 & 1 & 0 & 0 & 400 \\ 0 & 0 & 4 & -\frac{11}{7} & 0 & 1 & 0 & 1 & 0 & 25 \\ 0 & 0 & -\frac{3}{20} & \frac{9}{140} & 0 & \frac{1}{10} & 0 & 0 & 1 & 48 \end{array} \right]$$