DEPARTMENT OF MATHEMATICS

Ma 162 First (practice) Exam February 4, 2013

Instructions: No cell phones or network-capable devices are allowed during the exam. You may use calculators, but you must show your work to receive credit. If your answer is not in the box or if you have no work to support your answer, you will receive no credit. The test has been carefully checked and its notation is consistent with the homework problems. No additional details will be provided during the exam.

Problem	**Maximum Score**	**Actual Score**
1	12	
2	12	
3	13	
4	13	
5	13	
6	12	
7	13	
8	12	
Total	100	

NAME: _____ **Section:** _____

Last four digits of Student ID: _____

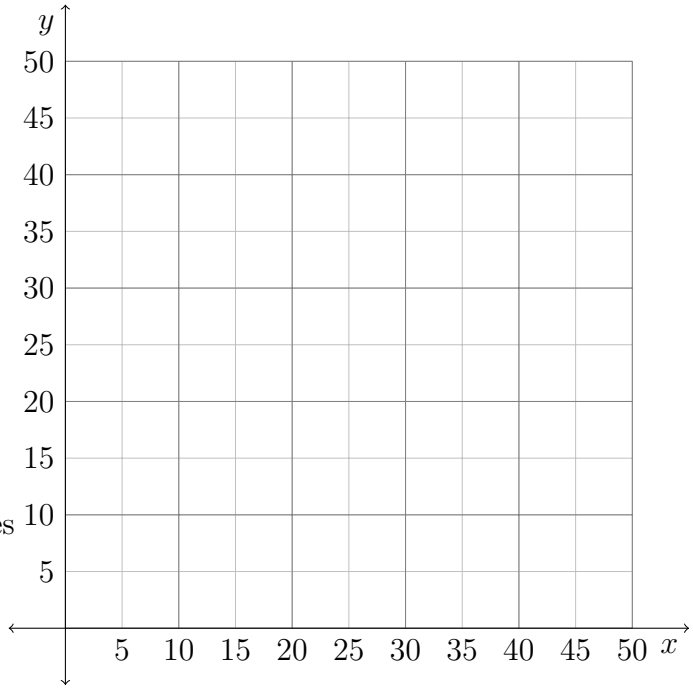
Show your work. Answers without justification receive no credit.

1. Basic intersections:

(a) On the given graph paper, graph and label the line defined by $4x + 3y = 120$

(b) On the given graph paper, graph and label the line defined by $2x + 5y = 100$

(c) On the given graph paper, label their intersection with approximate coordinates



(d) Using algebra, find the intersection exactly.

(e) Determine the value of $P = 1.25x + 1.35y$ at the point of intersection from part (d)

Show your work. Answers without justification receive no credit.

2. Assume a linear model of cost and revenue to predict profit. The following data is from the last two weeks (a bad week and a good week respectively):

Production level	**Cost**	**Revenue**	**Profit**
1200 ounces	\$575	\$975	\$400
1600 ounces	\$600	\$1300	\$700

(a) Predict the profit at 1300 ounces of production.

(b) Predict the profit at 1400 ounces of production.

(c) What level of production is needed for \$1000 of profit?

(d) What level of production results in \$0 of profit?

(e) Give a formula for the profit at x ounces of production.

Show your work. Answers without justification receive no credit.

3. The data analysts have done a best-linear-model-fit to the data on the suppliers and found that supply X is currently governed by $X = 48P + 85$ as long as the price P remains between \$5 and \$10 per unit. The demand is handled by another department, and they appear to be on vacation. You know that at \$5 per unit, 500 will be demanded, and at \$10 per unit only 240 will be demanded.

(a) What is the demand equation if one uses a linear model for demand?

(b) What is the equilibrium price and equilibrium demand?

Show your work. Answers without justification receive no credit.

4. You supervise 40 hours of assembly crew and 15 hours of shipping crew. They handle two products: the MintyBoost and the TV-B-Gone. The MB takes 15 minutes to assemble, and 5 minutes to pack, while the TV takes 10 minutes to assemble, and 5 minutes to pack. Middle management has given you free reign on how many to produce, but wants the workers kept busy on these two products.

	MB	TV	Labor
Assembly	15 min	10 min	40 hrs
Shipping	5 min	5 min	15 hrs

How many of each product should be made in order to keep the workers busy?

Give a plain english recommendation:

Now justify the answer with mathematics:

Show your work. Answers without justification receive no credit.

5. Consider the system of equations: $\begin{cases} 2x + 8y + 6z = 68 \\ x + 5y + 5z = 48 \\ 2x + 8y + 7z = 73 \end{cases}$

(a) Write the augmented matrix corresponding to this system of equations

(b) Find the general solution of this system of equations

$(x = \_\_\_\_\_, y = \_\_\_\_\_, z = \_\_\_\_\_)$

Show your work. Answers without justification receive no credit.

6. Consider the system of equations: $\begin{cases} 2x + 8y + 6z + 1w = 68 \\ x + 5y + 5z + 2w = 48 \\ 2x + 8y + 7z + 3w = 73 \end{cases}$

(a) Write the augmented matrix corresponding to this system of equations

(b) Find the general solution of this system of equations

$(x = \_\_\_\_\_, y = \_\_\_\_\_, z = \_\_\_\_\_, w = \_\_\_\_\_)$

Show your work. Answers without justification receive no credit.

7. You have three types of workers: packers, sewers, cutters. You have three types of products: short-sleeve, sleeveless, long-sleeve. It takes the following amount of time to make them:

	Short	**Less**	**Long**
Pack	4 min	3 min	4 min
Sew	24 min	22 min	28 min
Cut	12 min	9 min	15 min

You have 24 hours of packers, 160 hours of sewers, and 80 hours of cutters.

How many of each product should you make to keep everyone working?

Give a plain english recommendation:

Now justify the answer with mathematics:

Show your work. Answers without justification receive no credit.

8. You have three types of workers: packers, sewers, cutters. You have four types of products: short-sleeve, sleeveless, long-sleeve, scarf. It takes the following amount of time to make them:

	Short	**Less**	**Long**	**Scarf**
Pack	4 min	3 min	4 min	5 min
Sew	24 min	22 min	28 min	2 min
Cut	12 min	9 min	15 min	9 min

You have 24 hours of packers, 160 hours of sewers, and 80 hours of cutters.

(a) There are many ways to keep the workers busy. Write a general formula for these ways.

(b) Suppose you get paid per item made (each one worth the same amount). How can you maximize the number of items made, while keeping the workers busy?

Give a plain english recommendation:

Now justify the answer with mathematics: