1. The Tablette Corporation makes tablet computers at plants in Thailand and Malaysia. At the Thailand plant, unit costs are \$79 and fixed costs are \$9000, while in Malaysia unit costs are \$71 and fixed costs are \$9400.

a) If Tablette needs 600 tablets made, which plant does so at a lesser cost? JUSTIFY YOUR ANSWERb) How many tablets would see the costs at each plant being the same?

2. Given the System of Equations:

3x + 2y + z + 20w = 6 x + 2y + z + 10w = 0 x + y + z + 6w = 22x + 2y + z + 15w = 3

a) Use your calculator to solve, leaving solution in parametric form

b) Find the specific solution when $x_2 = 6$

c) Perform, **BY HAND**, a full check of this particular solution

3. A home appliance manufacturer has been selling a kitchen stove model several markets and wishes to enter new markets. Atlanta has 6.1 million people and they sold 13,286 stoves, Tampa has 2.8 million with 5,123 sold, Miami has 6.4 million with 17,522 sold, Charlotte(NC) has 2.5 million with 4,848 sold, and Greenville(SC) has 1.4 million with 3,613 sold.

a) Using Population figures in Millions and sales as they are given, use LinReg in constructing the Least Squares Line of Best Fit for this data set. Round-off values to the nearest thousandth.b) Use your line to predict the sales generated by entering a market like Orlando with 2.9 million people.

c) What sized market does your model suggest is necessary to sell 20,000 units?

4. SHOW ALL WORK in solving: 3x+10y=92x+6y=5 by the $X = A^{-1}B$ method.

5. List the Intercepts of the Inequality and then sketch the graph using the "bad" side shading from lecture $8x + 6y \ge 144$

6. Foodie Corp. makes food additives providing vitamins A and D. Each ounce of Type I has 200mg of vitamin A, 100mg of vitamin D, and costs \$0.24, while each ounce of Type II has 120mg of vitamin A, 300mg of vitamin D, and costs \$0.18 per ounce. A customer wants to create a vitamin supplement granola bar with at least 800mg of vitamin A and at least 1200mg of vitamin D, but at the least cost. **Set up the Linear Programming Problem. DO NOT SOLVE.**

- 7. Graph the Inequalities and determine the Feasible Set. **SHOW WORK**. Clearly mark your Axes and label graphed points with coordinates for full credit.
- $2x + y \le 8$ $-2x + 6y \ge 6$ $x \ge 1$
- 8. Solve each System of Equations using the "RREF" function on your calculator. Show your augmented matrix and the resulting one from RREF, plus your solution.

| -2x - 3y + 2z = -2 | x + y + 4z = 3 |
|--------------------|-----------------------|
| a) $x + y = 3$ | b) $4x + y - 2z = -6$ |
| -x - 3y + 5z = 8 | -3x + 2z = 1 |

9. Pivot BY HAND on the element in row 2, column 2. SHOW ALL WORK/STEPS, and NO CALCULATORS.

 $\begin{bmatrix} 3 & -3 & -7 & 6 \\ -4 & 2 & 6 & -8 \\ -2 & 5 & 1 & -4 \end{bmatrix}$

10. Turn the system into an Augmented Matrix. Use RREF to reduce the matrix. Show the Infinite Solution in proper form.

$$2y + z - w = 1$$
$$x - y + z + w = 14$$
$$-x - 9y - z + 4w = 11$$
$$x + y + z = 9$$

11. Perform each indicated Elementary Row Operation, always starting from the original matrix.

$$\begin{bmatrix} 2 & -5 & 1 & 6 & -4 \\ 0 & 3 & -5 & 8 & -6 \\ -4 & 2 & -6 & -14 & 8 \\ 7 & -3 & 2 & 9 & -1 \end{bmatrix}$$

a) $R_2 \leftrightarrow R_4$ b) $-4R_3 \rightarrow R_3$ c) $3R_2 + R_1 \rightarrow R_1$ d) $R_2 + R_4 \rightarrow R_4$

12. Solve the System of Equations below USING the "RREF" function on your calculators.

- a) Properly show the Infinite solution of the system. Show details of how you find it.
- b) Find the particular solution when w = 4
- c) Find the particular solution when y = 4
 - -x+2y+z-10w = 8-2x+3y+z-19w = 14 2x-4y-3z+17w = -10 -x+y -9w = 6

13. The small, isolated town of Sandwich, IL has two industries, Peanut Butter and Jelly. To produce \$1, the Peanut Butter industry needs \$0.12 of their own output and \$0.05 of Jelly, while to produce \$1 in Jelly, they need \$0.14 of their own output and \$0.08 from Peanut Butter. The townsfolk need \$4000 in Peanut Butter and \$2800 in Jelly next year. How much should be produced by each industry? a) **Name and show ALL** relevant matrices

b) Use $X = (I - A)^{-1} D$ (calculator allowed) to determine production levels, rounded to the nearest dollar.

14. **SHOW ALL WORK** in finding the Inverse of:
$$\begin{bmatrix} -4 & Q \\ 2 & 0 \end{bmatrix}$$
.

15. Graph the Inequalities and determine the Feasible Set. SHOW WORK.

Clearly mark your Axes and label graphed points with coordinates for full credit.

 $4x + y \ge 40$ $2x + 6y \ge 36$ $x \ge 0, y \ge 0$

- 16. Use your calculator's Linear Regression function to answer the questions below regarding the data table of values showing the average age at which men married over time. USE X = 0 for 1970.
- a) What is the Line of Best Fit, in Y = AX + B form? Round values to 2 places behind the decimal
- b) What is the expected Average Age at marriage in 2013?
- c) In what year does the table predict an Average Age of 38?

| Year | Avg Age |
|------|---------|
| 1970 | 23.2 |
| 1975 | 23.8 |
| 1980 | 24.7 |
| 1988 | 25.8 |
| 1994 | 26.7 |
| 1999 | 26.9 |
| 2004 | 27.1 |
| 2006 | 27.5 |
| 2009 | 28.1 |

17. A certain economy has three industries: metals, plastic, and wood. To produce \$1 of output, the metals industry needs \$0.08 of its own output, \$0.03 from plastics, and \$0.07 from wood. To produce \$1 of output, the plastic industry needs \$0.11 of its own output and \$0.02 from wood. To produce \$1 of output, the wood industry needs \$0.10 of its own output, \$.05 from metals, and \$0.04 from plastic. If the population needs, in Millions, \$32 of metal, \$25 of plastic, and \$40 of wood, how much of each must be produced to satisfy this demand? 14pts

a) Name and show ALL relevant matrices

b) Use $X = (I - A)^{-1} D$ (calculator allowed) to determine production levels, rounded to the nearest tenth of a Million.

18. A plane carries two types of packages. Type A weighs 140 pounds and takes up 3 cubic feet of space and generates \$175 in revenue, while a Type B package weighs 185 pounds and takes up 5 cubic feet, generating revenues of \$240 per package. The plane is limited to 6000 total pounds in 300 total cubic feet of space. **Construct a full Linear Programming Problem** with an Objective function and ALL necessary constraints. DO NOT SOLVE.