Math 1313
Test 2 Review
Sections 1.4, 1.5, Chapter 2 and Chapter 3

Example 1: Pull Company installed a new machine in one of its factories at a cost of $150,000. The machine is depreciated linearly over 10 years with no scrap value. Find an expression for the machine's book value in the t-th year of use ($0 \leq t \leq 10$)

Example 2: A piece of equipment was purchased by a company for $10,000 and is assumed to have a scrap value of $3,000 in 5 years. If its value is depreciated linearly, find the value of the equipment after 3 years ($0 \leq t \leq 5$).

Example 3: A bicycle manufacturer experiences fixed monthly costs of $75,000 and fix costs of $75 per standard model bicycle produced. The bicycles sell for $125 each.

a. What is the cost, revenue and profit functions?

b. What is the break-even point?

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Example 4: Solve using Gauss-Jordon.

$$\left[\begin{array}{ccc|c} \mathbf{1} & \mathbf{3} & \mathbf{1} & \mathbf{3} \\ \mathbf{0} & \mathbf{1} & \mathbf{0} & \mathbf{2} \\ \mathbf{1} & \mathbf{-6} & \mathbf{0} & \mathbf{-13} \end{array}\right]$$

Example 5: Determine which of the following matrices are in row-reduced form. If a matrix is not in row-reduced form, state why.

a. $\left[\begin{array}{ccc|c} 1 & 0 & 0 & -3 \\ 0 & 1 & 0 & -2 \\ 0 & 0 & 0 & 0 \end{array}\right]$ b. $\left[\begin{array}{cc|c} 0 & 1 & -2 \\ 1 & 0 & 3 \end{array}\right]$ c. $\left[\begin{array}{ccc|c} 1 & 9 & 0 & 2 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 \end{array}\right]$

Example 6: The reduced form for the augmented matrix of a system with 3 equations and 3 unknowns is given. Give the solution to the system, if it exists.

a. $\left[\begin{array}{ccc|c} 1 & 0 & -5 & -3 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 0 & 6 \end{array}\right]$ b. $\left[\begin{array}{ccc|c} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 3 \end{array}\right]$ c. $\left[\begin{array}{ccc|c} 1 & 0 & 1 & 1 \\ 0 & 1 & 0 & 2 \end{array}\right]$

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Example 7: Find the value for x and y:

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \\ x & -1 \end{bmatrix} - 3\begin{bmatrix} y-1 & 2 \\ 1 & 2 \\ 4 & -3 \end{bmatrix} = 2\begin{bmatrix} -4 & -2 \\ 0 & -1 \\ 4 & 4 \end{bmatrix}$$

Example 8: Given the following matrices find the product.

$$\begin{bmatrix} 0 & -2 & 1 \\ 4 & -1 & 0 \end{bmatrix}\begin{bmatrix} 1 & -2 \\ 0 & 1 \\ -2 & -1 \end{bmatrix}$$

Example 9: Find the transpose of matrix A.

$$A = \begin{bmatrix} 1 & -4 & 3 \\ -2 & 7 & \frac{4}{3} \end{bmatrix}$$

Example 10: Find the inverse of matrix A.

$$\begin{bmatrix} -3 & 4 \\ 1 & -2 \end{bmatrix}$$

Example 11: Solve the system of equations by using the inverse of the coefficient matrix.

$$\boldsymbol{x - y = -4}$$
$$\boldsymbol{5x + 6y = 2}$$

Example 12: A vineyard produces two special wines a white and a red. A bottle of the white wine requires 14 pounds of grapes and one hour of processing time. A bottle of red wine requires 25 pounds of grapes and 2 hours of processing time. The vineyard has on hand 2,198 pounds of grapes and can allot 160 hours of processing time to the production of these wines. A bottle of the white wine makes $11.00 profit, while a bottle of the red wines makes $20.00 profit. Set-up the linear programming problem so that profit can be maximized.

13. Solve the linear programming problem.

Max $P(x) = 3x + 7y$

St: $2x+5y \leq 20$

$x+y \leq 7$

$x, y \geq 0$

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14. Solve the linear programming problem.

Min $C(x) = x + 6y$
St: $3x+4y \geq 36$
$2x+y \geq 14$
$x, y \geq 0$