Exam 1 Review over Chapters 1 and 2

- Basic Matrix Operations
- Matrix Multiplication
- Review of Lines
- Modeling with Linear Functions
- Systems of Two Equations in Two Unknowns
- Setting Up and Solving Systems of Linear Equations

Pr 1. State the dimensions of the matrix $A = \begin{bmatrix} -1 & 4 & 3w \\ 2 & -9 & 10 \\ 5y & 0 & -8 \\ 0 & -6 & -7 \end{bmatrix}$.

Pr 2. State the value of b_{32} given $B = \begin{bmatrix} -6 & 7x & y \\ 5w & -2 & 9 \\ -3y & 1 & 0 \\ 4x & 8 & 10w \end{bmatrix}$.

Pr 3. If A is a 2×1 matrix, B is a 2×1 matrix, and C is a 1×2 matrix, determine the size of $(3A+4B)^T - 0.5C$, if possible.

Pr 4. Determine the value of w, x, and y given $\begin{bmatrix} 2 & w-1 \\ 3 & 4x \end{bmatrix} - \begin{bmatrix} y & -6 \\ -8 & 12 \end{bmatrix}^T = 3\begin{bmatrix} -1 & 7 \\ 3 & -4 \end{bmatrix}$

Pr 5. There are three convenience stores in Riley. Last week, the east store sold 88 gallons of milk, 48 bags of potato chips, 16 boxes of devil food cakes, and 112 cans of soda. The west store sold 105 bags of potato chips, 72 gallons of milk, 21 boxes of devil food cakes, and 147 cans of soda. The north store sold 60 boxes of devil food cakes, 40 bags of potato chips, 50 cans of soda, but no gallons of milk. Use a 4×3 matrix to express the sales information for these three stores last week. Then if sales at the convenience stores are expected to decrease by 18% next week, use a matrix to show the expect sales for next week.

Pr 6. If A is a 2×1 matrix, B is a 2×1 matrix, and C is a 3×2 matrix, determine the size of CAB^T, if possible.

Pr 7. Compute $\begin{bmatrix} -3 & 4x & 2 \\ 5w & 0 & 4y \end{bmatrix} \begin{bmatrix} -6 & 4m \\ 2n & 3 \\ -p & 0 \end{bmatrix}$.

Pr 8. There are three convenience stores in Riley. Last week, the east store sold 88 gallons of milk, 48 bags of potato chips, 16 boxes of devil food cakes, and 112 cans of soda. The west store sold 105 bags of potato chips, 72 gallons of milk, 21 boxes of devil food cakes, and 147 cans of soda. The north store sold 60 boxes of devil food cakes, 40 bags of potato chips, 50 cans of soda, but no gallons of milk. If all three stores sell a gallon of milk for \$1.59, a can of soda for \$0.79, a bag of potato chips for \$1.19 and a box of devil food cakes for \$1.99, how much money did each store bring in last week?

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Pr 9. Write the equation of the line that passes through the point $(6, -7)$ and has a slope of zero.

Pr 10. You have a line which passes through the points $(-3, -4)$ and $\left(\frac{1}{2}, \frac{2}{3}\right)$. If x decreases by 8 units, what is the corresponding change in y?

Pr 11. An automobile purchased for use by the manager of a firm at a price of \$14,000 is to be depreciated usinga linear model over ten years. What will the book value of the automobile be at the end of five years if the automobile has a scrap value of \$1,000 at the end of 10 years?

Pr 12. Dave sells widgets at his widget stand. He buys the widgets for \$5 each. When he sells 30 in a month, then his profit is \$276. When he sells 20 widgets in a month, then his cost for that month is \$514.

(a) Determine the linear cost function.

(b) Determine the linear revenue function.

(c) Determine the linear profit function.

(d) Determine and interpret the break-even point.

Pr 13. If an ipod costs \$400, 2000 sell. If the price increases to \$500, then 1500 sell. The producer is willing to provide 700 ipods if the price is \$580 and are willing to provide 1300 ipods when the price is \$940. Assume supply and demand are linear.

(a) Determine the linear supply equation.

(b) Determine the linear demand equation.

(c) Determine and interpret the equilibrium point.

Pr 14. Determine the value of k so that the following system of linear equations has exactly one solution.

$$\begin{aligned} -2x + ky &= 24 \\ 3x - 8y &= 35 \end{aligned}$$

Pr 15. Solve the following system using substitution.

$$\begin{aligned} 3x + 10y &= 115 \\ 11x + 4y &= 95 \end{aligned}$$

Pr 16. Solve the following system using the addition method.

$$\begin{aligned} 3x - y &= 4 \\ -\tfrac{1}{2}x + \tfrac{1}{6}y &= \tfrac{2}{3} \end{aligned}$$

Pr 17. Set up and solve the following problem as a system of linear equations.

Link has \$17,360 to invest. He decides to invest in three different companies. The QX company costs \$130 per share and pays dividends of \$1.50 per share each year. The RY company costs \$75 per share and pay dividends of \$1.00 per share each year. The KZ company costs \$90 per share and pays \$2.00 per share per year in dividends. Link wants to have twice as much money in the RY company as in the KZ company. Link also wants to earn \$252 in dividends per year. How much should Link invest in each company to meet his goals?

Pr 18. Write the augmented matrix corresponding to the given system of linear equations.

$$\begin{aligned} 2x - 5y &= 4 \\ -4x + 2y - 7z &= -5 \\ -y + 4 &= 3z \end{aligned}$$

Pr 19. Determine if the augmented matrix is in reduced row-echelon form or not.

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & -4 \\ 0 & 0 & 1 & -6 \\ 0 & 0 & 0 & 1 \end{array}\right]$$

Pr 20. Perform the following row operations $2R_1 + R_2 \to R_2$ and $-R_1 + R_3 \to R_3$, in order on the given matrix.

$$\left[\begin{array}{ccc|c} 1 & 0 & 9 & 12 \\ -2 & 2 & 1 & 3 \\ 1 & 2 & -3 & 8 \end{array}\right]$$

Pr 21. Use row operations to transform the matrix into reduced row-echelon form.

$$\left[\begin{array}{cc|c} 1 & 1 & 5 \\ 3 & 2 & 12 \end{array}\right]$$

Pr 22. Solve the system of linear equations, using technology.

$$\begin{aligned} y &= x - 3 \\ y - z &= 1 \\ x + z &= 4 \end{aligned}$$

Pr 23. Solve the system of linear equations, using technology.

$$\begin{aligned} 4x + 4y - 4z &= 24 \\ 2x + z &= -9 \\ -x - y + z &= -6 \end{aligned}$$

Pr 24. Assume your solution to a real-world application problem was $(x, y, z) = (10 - 2t, -3 + t, t)$. If x, y, and z represent the number of whole items produced, how many solutions does the problem actually have?