

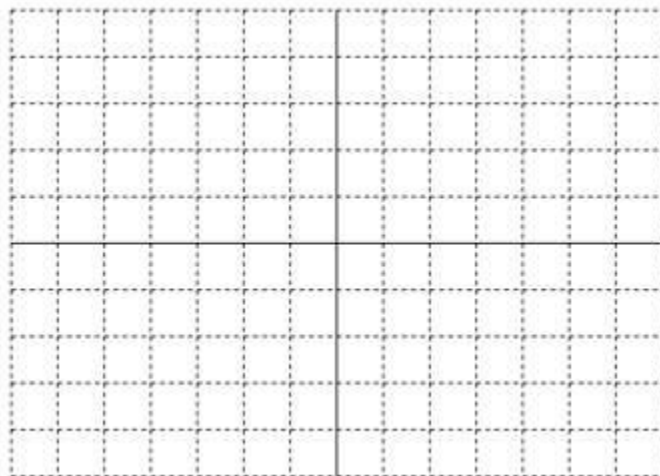
MAT126 – Technical Math & Trig

Assignment 4

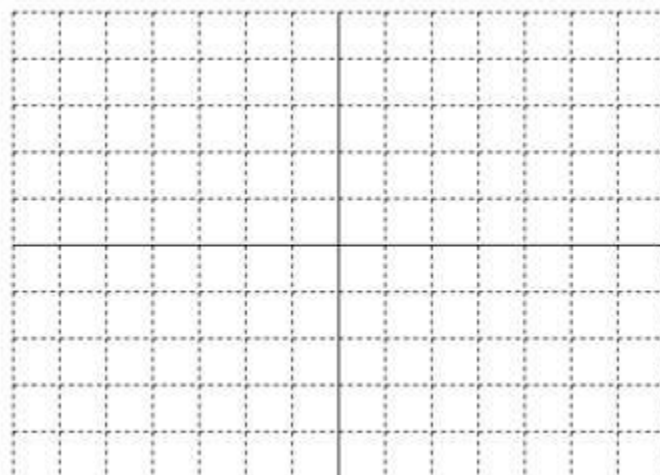
For each of the following,

- Find the equation of the line.
- Write the equation in slope-intercept form
- Graph the line.

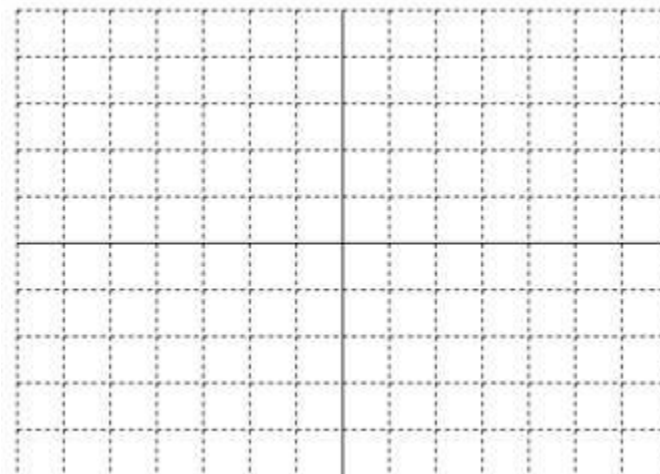
1. A line has slope $m = -3$ and passes through the point $(-6, 1)$.



2. A line has slope $m = 3/2$ and passes through the point $(0, -5)$.



3. A line passes through the points $(-4, 4)$ and $(-1, -2)$.



Solve each system by any algebraic method (graphing, substitution, elimination). If you solve by graphing, include the graphs as part of your answer.

4.
$$\begin{cases} 4x + y = -8 \\ 3x + 2y = 0 \end{cases}$$

5.
$$\begin{cases} x - 2y = 7 \\ 3x + 4y = 1 \end{cases}$$

6.
$$\begin{cases} x + y + 2z = 0 \\ 2x - y + z = 6 \\ 4x + 2y + 2z = 0 \end{cases}$$

7.
$$\begin{cases} x + 2y + 3z = 4 \\ 2x - 3y - 4z = -1 \\ 3x - 4y + 5z = 6 \end{cases}$$

Find the determinant of each of the following. Do NOT use a calculator. Show your work.

8. $\begin{vmatrix} 4 & -5 \\ 6 & 2 \end{vmatrix}$

10. $\begin{vmatrix} 5 & 2 & 3 \\ 4 & 5 & -6 \\ 2 & 5 & -9 \end{vmatrix}$

9. $\begin{vmatrix} 6 & -3 \\ \frac{1}{3} & -\frac{2}{3} \end{vmatrix}$

11. $\begin{vmatrix} 4 & 2 & -1 \\ 3 & 7 & -4 \\ -2 & 1 & 1 \end{vmatrix}$

12. Use a calculator or spreadsheet to evaluate the determinant $\begin{vmatrix} 2.1 & 5.7 & 3.4 & 6 \\ 0.1 & 0.3 & 7.1 & 3.5 \\ 1.05 & 2.85 & 1.7 & 3 \\ 18 & \frac{1}{3} & 6.73 & 9 \end{vmatrix}$.

Solve each system using Cramer's Rule

$$13. \begin{cases} 3x + y = 3 \\ 3x - 3y = 13 \end{cases}$$

$$14. \begin{cases} 4x + 3y = 2 \\ 3x - 2y = -24 \end{cases}$$

$$15. \begin{cases} x + y + z = 2 \\ 8x - 2y + 4z = -3 \\ 6x - 4y - 3z = 3 \end{cases}$$

$$16. \begin{cases} x + y + 5z = -10 \\ x - y - 5z = 11 \\ -x + y - 5z = 13 \end{cases}$$

$$17. \begin{cases} 3x + 3y - z + w = -25 \\ 4x + 5y - z - 2w = -8 \\ x + y - z + w = 1 \\ 6x + 7y - z - 3w = 17 \end{cases}$$

Solve (18 – 26) by setting up a system of equations. You may solve the system using any method you choose: Graphing, Substitution, Addition, Cramer's Rule. Write your answer as part of a complete sentence with appropriate units and the correct number of significant figures.

18. A store owner makes a special blend of coffee from Colombian Supreme costing \$4.99/lb and Mocha Java costing \$5.99/lb. The mixture sells for \$5.93/lb. If this mixture is made in 50.0-lb batches, how many pounds of each type should be used?

19. A 12-L cooling system is filled with 25% antifreeze. How many liters must be replaced with 100% antifreeze to raise the strength to 45% antifreeze? Round your answer to the correct number of significant figures.

20. By weight a 10-10-10 fertilizer contains 10.0% nitrogen, 10.0% phosphorus, and 10.0% potash. A 12-0-6 fertilizer contains 12.0% nitrogen, no phosphorous, and 6.00% potash. A landscaper has three types of fertilizer in stock. One is 10-12-15, a second is 10-0-5, and a third is 30-6-15. How much of each must be mixed in order to get 400 lb of fertilizer that is 16-3-9?

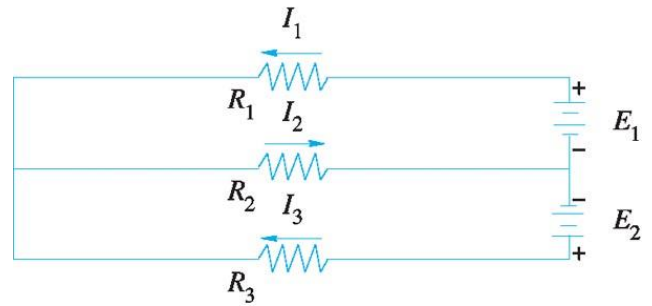
21. A petroleum engineer was testing three different gasoline mixtures, A, B, and C in the same car and under the same driving conditions. She noticed that the car traveled 90 km farther when it used mixture B than when it used mixture A. Using the fuel C, the car traveled 130 km more than when it used fuel B. The total distance traveled was 1900 km. Find the distance traveled on the three fuels.

Using the figure shown, find the currents in the three resistors of the circuit. Round your answer to the correct number of significant figures.

$$E_1 - I_1 R_1 - I_2 R_2 = 0$$

$$E_2 - I_2 R_2 - I_3 R_3 = 0$$

$$I_2 = I_1 + I_3$$



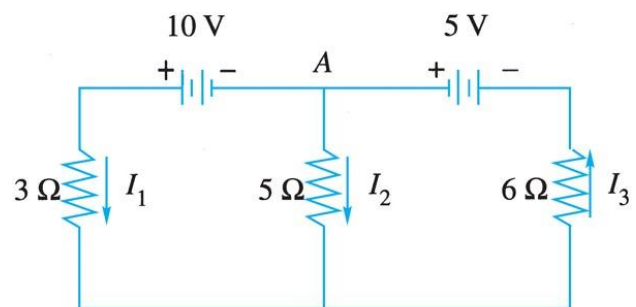
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22. Given $E_1 = 8.0 \text{ V}$, $E_2 = 5.0 \text{ V}$, $R_1 = 3.0 \Omega$, $R_2 = 5.0 \Omega$, $R_3 = 6.0 \Omega$

23. Given $E_1 = 10.0 \text{ V}$, $E_2 = 15.0 \text{ V}$, $R_1 = 2.00 \Omega$, $R_2 = 4.00 \Omega$, $R_3 = 8.00 \Omega$

24. Applying Kirchoff's laws to the circuit pictured produces the following equations. Find the currents associated with I_1 , I_2 , and I_3 . Round your answers to the nearest tenth.

$$\begin{cases} I_1 + I_2 - I_3 = 0 \\ 3I_1 - 5I_2 - 10 = 0 \\ 5I_2 + 6I_3 - 5 = 0 \end{cases}$$



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25. The perimeter of a rectangular field is 72 miles. The length of the field is 9.0 miles longer than the width. What are the length and width of the field? Round your answer to the correct number of significant figures.

26. If three cables are joined at a point and three forces are applied so the system is in equilibrium, the given system of equations results. Determine the three forces, F_a , F_b , and F_c measured in Newtons (N)

$$\begin{cases} \frac{6}{7}F_b - \frac{2}{3}F_c = 2000 \\ -F_a - \frac{3}{7}F_b + \frac{1}{3}F_c = 0 \\ \frac{2}{7}F_b - \frac{2}{3}F_c = 1200 \end{cases}$$