

Name: _____
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Date: _____
Ms. Loughran

Do Now:

1. Find the complete solution of the system using matrices.

$$\begin{aligned}x - 2y + 5z &= 3 \\ -2x + 6y - 11z &= 1 \\ 3x - 16y + 20z &= -26\end{aligned}$$

$$\left[\begin{array}{ccc|c} 1 & -2 & 5 & 3 \\ -2 & 6 & -11 & 1 \\ 3 & -16 & 20 & -26 \end{array} \right] \xrightarrow{2R_1 + R_2} \left[\begin{array}{ccc|c} 1 & -2 & 5 & 3 \\ 0 & 2 & -1 & 7 \\ 3 & -16 & 20 & -26 \end{array} \right]$$

$$\xrightarrow{-3R_1 + R_3} \left[\begin{array}{ccc|c} 1 & -2 & 5 & 3 \\ 0 & 2 & -1 & 7 \\ 0 & -10 & 5 & -35 \end{array} \right] \xrightarrow{5R_2 + R_3} \left[\begin{array}{ccc|c} 1 & -2 & 5 & 3 \\ 0 & 2 & -1 & 7 \\ 0 & 0 & 0 & 0 \end{array} \right]$$

Infinite # of solutions

$$(38 - 8y, y, 2y - 7)$$

or

$$\left(10 - 4z, \frac{7+z}{2}, z \right)$$

$$2y - z = 7$$

$$2y = 7 + z$$

$$y = \frac{7+z}{2}$$

$$\left. \begin{aligned}x - 2\left(\frac{7+z}{2}\right) + 5z &= 3 \\ x - 7 - z + 5z &= 3\end{aligned} \right\} \begin{aligned}x + 4z - 7 &= 3 \\ x &= 10 - 4z\end{aligned}$$

$$\textcircled{1} (-7-h)^2 + (6-k)^2 = (9-h)^2 + (6-k)^2$$

$$h^2 + 14h + 49 = h^2 - 18h + 81$$

$$32h = 32$$

$$h = 1$$

plug that $h=1$ into 2 equations (can't be the same ones you used to find that h)

$$(9-h)^2 + (6-k)^2 = (-4-h)^2 + (13-k)^2$$

$$(9-1)^2 + (6-k)^2 = (-4-1)^2 + (13-k)^2$$

$$64 + k^2 - 12k + 36 = 25 + k^2 - 26k + 169$$

$$-12k + 100 = -26k + 194$$

$$14k = 94$$

$$k = \frac{94}{14} = \frac{47}{7}$$

center: $(1, \frac{47}{7})$

$$(x-1)^2 + (y - \frac{47}{7})^2 = r^2$$

plug in one of the points: $(9,6)$

$$(9-1)^2 + (6 - \frac{47}{7})^2 = r^2$$

$$64 + (\frac{42}{7} - \frac{47}{7})^2 = r^2$$

$$64 + (\frac{25}{49}) = r^2$$

$$r^2 = \frac{3161}{49}$$

$$(x-1)^2 + (y - \frac{47}{7})^2 = \frac{3161}{49}$$

or

$$x^2 + y^2 - 2x - \frac{94}{7}y - \frac{189}{7} = 0$$

$$\textcircled{2} (2-h)^2 + (1-k)^2 = (0-h)^2 + (5-k)^2$$

$$h^2 - 4h + 4 + k^2 - 2k + 1 = h^2 + k^2 - 10k + 25$$

$$-4h - 2k + 5 = -10k + 25$$

$$-4h + 8k = 20$$

$$\text{or } \boxed{-2h + 4k = 10}$$

$$(0-h)^2 + (5-k)^2 = (-1-h)^2 + (2-k)^2$$

$$h^2 + k^2 - 10k + 25 = h^2 + 2h + 1 + k^2 - 4k + 4$$

$$-10k + 25 = 2h - 4k + 5$$

$$\boxed{20 = 2h + 6k}$$

$$-2h + 4k = 10$$

$$2h + 6k = 20$$

$$\hline 10k = 30$$

$$k = 3$$

$$-2h + 4(3) = 10$$

$$-2h + 12 = 10$$

$$-2h = -2$$

$$h = 1$$

Center: (1, 3)

$$\rightarrow (x-1)^2 + (y-3)^2 = r^2$$

plug in a point: (0, 5)

$$(0-1)^2 + (5-3)^2 = r^2$$

$$1 + 4 = r^2$$

$$r^2 = 5$$

$$(x-1)^2 + (y-3)^2 = 5$$

or

$$x^2 + y^2 - 2x - 6y + 5 = 0$$