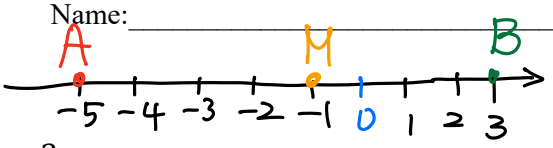
# MAT 1275, Classwork19, Fall2024

ID:_____ Name:_____

1. Midpoint formula of one variable:

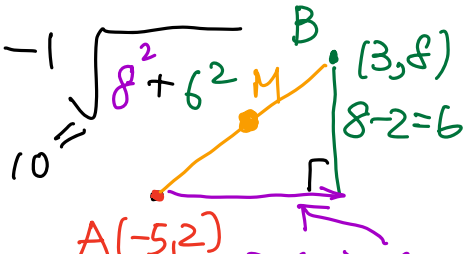



Let point A be at $x = -5$ and point B be at $x = 3$.

What is the distance between point A and point B? $3-(-5) = 3+5 = 8$

What is the midpoint of point A and point B? $\frac{3+(-5)}{2} = \frac{-2}{2} = -1$

2. Midpoint formula of two variables:




Let point A be at $(-5, 2)$ and point B be at $(3, 8)$.

What is the distance between point A and point B? 10

What is the midpoint of point A and point B? $M = \frac{A+B}{2} = \left(\frac{-5+3}{2}, \frac{2+8}{2}\right) = \left(\frac{-2}{2}, \frac{10}{2}\right) = (-1, 5)$

3. Find the center to a circle whose diameter has endpoints $(-5, 2)$ and $(3, 8)$.

What is the radius of this circle? From Q2, we know diameter = 10, radius $= \frac{10}{2} = 5$

What is the equation of this circle? $(x-(-1))^2 + (y-5)^2 = 5^2$

4. Given three equations: a) $x - 2y = 6$, b) $x + y^2 + 2y + 1 = 0$, c) $x^2 - 4x + 2y + 1 = 0$.

d) $2x + y = 7$, e) $x^2 - 4x + y^2 + 2y + 1 = 0$, f) $x - 2y = 8$ g) $y = 1$

Which one is a line? a), d), f), g)

Which one is a circle? e)

Which one is a parabola? b) c)

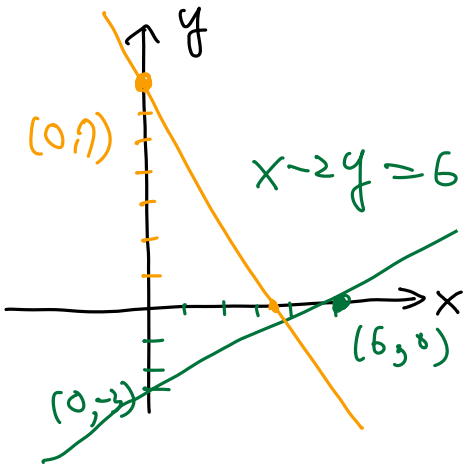
5. Solve : if there is a $(x, y)$ which satisfies both equations

$\begin{cases} x - 2y = 6 \\ 2x + y = 7 \end{cases}$ → (0, -3) (-2, -4) (6, 0)

(4, -1) (0, 7) $(\frac{7}{2}, 0)$ ←

(Three methods: 1) graphing, 2) substitution, or 3) elimination.)

1)




2) $x - 2y = 6$

$2x + y = 7 \Rightarrow y = -2x + 7$

$-2x \quad -2x$

Replace the "green y" by "yellow y"

$x - 2(-2x+7) = 6$

$\Rightarrow x + 4x - 14 = 6$

$+14 \quad +14$

$\Rightarrow 5x = 20$

$\Rightarrow x = 4$

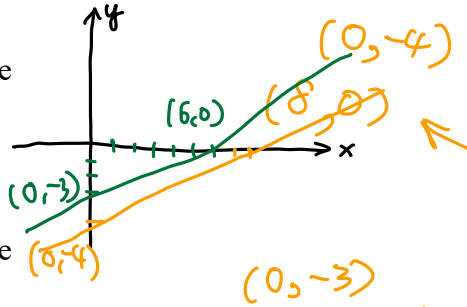
$y = -2 \cdot 4 + 7 = -1$

$4 - 2y = 6$

$-4 \quad -4$

$-2y = 2 \Rightarrow y = -1$

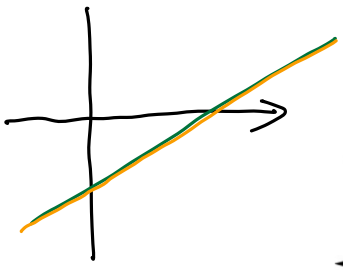
6. Solve




$\begin{cases} x-2y=6 \\ x-2y=8 \end{cases}$ → (0,-3) , (6,0)

⇒ sol. is (4,-1)

7. Solve

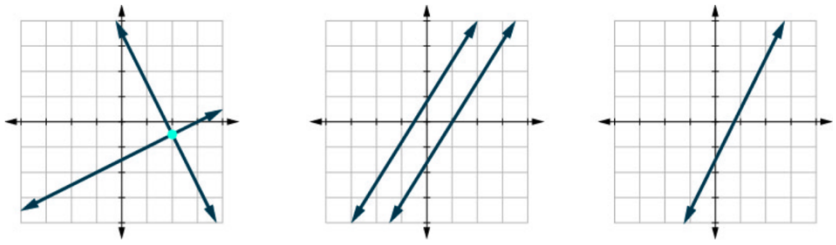


(0,-3)
(6,0)

$\begin{cases} x-2y=6 \\ 2x-4y=12 \end{cases}$ → (0,-3), (6,0)

→ $y=\frac{6-x}{-2}$

the solution is $(x, \frac{6-x}{-2})$ for any x.



Intersecting Parallel Coincident

| Lines | Intersecting | Parallel | Coincident |
|---|---|---|---|
| Number of solutions | 1 solution | 0 solution | infinitely many solutions |
| Consistent/Inconsistent | Consistent | Inconsistent | Consistent |
| Dependent/Independent | Independent | Independent | Dependent |

8. Solve

$\begin{cases} x^2-2y=4 \\ x+y=2 \end{cases}$ parabola, line

| | z | −y |
|---|---|---|
| z | 4 | −2y |
| −y | −2y | $y^2$ |

$x=2-y$

$x^2-2y=4$

$(2-y)^2-2y=4$

$4-4y+y^2-2y=4$

$y^2-6y+4=4$

$-4 \quad -4$

$y^2-6y=0$

$y(y-6)=0$

$y=0$ or $y-6=0$

$\Rightarrow y=0$ or $y=6$

using $x=2-y$

$y=0$, $x=2$ → (2,0)

$y=6$, $x=-4$ → (-4,6)

$y=2-x$

$x^2-2y=4$

$x^2-2(2-x)=4$

$x^2-4+2x=4$

$-4 \quad -4$

$x^2+2x-8=0$

$x \quad -2$

$x \quad +4$

$\Rightarrow (x-2)(x+4)=0$

$\Rightarrow x-2=0$ or $x+4=0$

$+2 \quad +2 \qquad -4 \quad -4$

$\Rightarrow x=2$ or $x=-4$

Using $y=2-x$

$x=2$, $y=0$ → (2,0)

$x=-4$, $y=6$ → (-4,6)