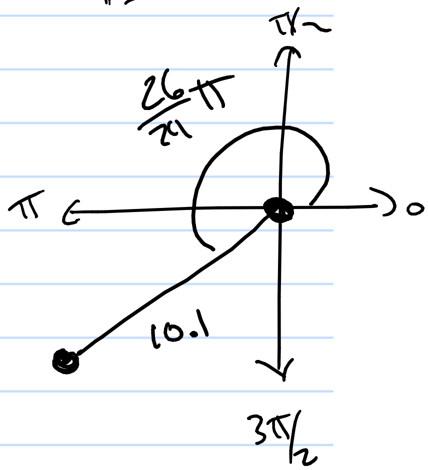
Math 112

Q's

7 A curve in polar coordinates is given by: $r = 12 + 2\cos\theta$.
Point P is at $\theta = \frac{26\pi}{24}$.

$r = 12 + 2\cos\left(\frac{26}{24}\pi\right)$

θ	r
$\frac{26\pi}{24}$	10.1



a.) Find polar coordinate r for P, with $r > 0$ and $\pi < \theta < \frac{3\pi}{2}$.

$r =$ 10.1

b.) Find cartesian coordinates for point P.

$x =$ $r\cos\theta$ $= 10.1\cos\left(\frac{26}{24}\pi\right) \approx ?$

$y =$ $r\sin\theta$ $= 10.1\sin\left(\frac{26}{24}\pi\right) \approx ?$

c.) How may times does the curve pass through the origin when $0 < \theta < 2\pi$?

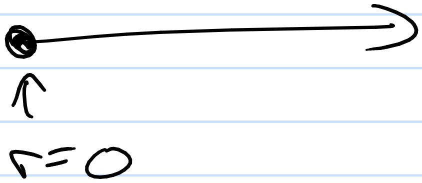
Answer: DNE

$\nexists$ $r=0$

$0 = 12 + 2\cos\theta$

$\cos\theta = -6$

never



9 Convert $xy = 9$ to an equation in polar coordinates.

$9/(\cos(t)\cdot\sin(t))$ $= r^2$

Note: use "t" for θ

$xy = 9$

$(r\cos\theta)(r\sin\theta) = 9$

$r^2\cos\theta\sin\theta = 9$

$$r^2 = \frac{9}{\cos\theta\sin\theta}$$

$$= 9\sec\theta\csc\theta$$

Pre-Calculus

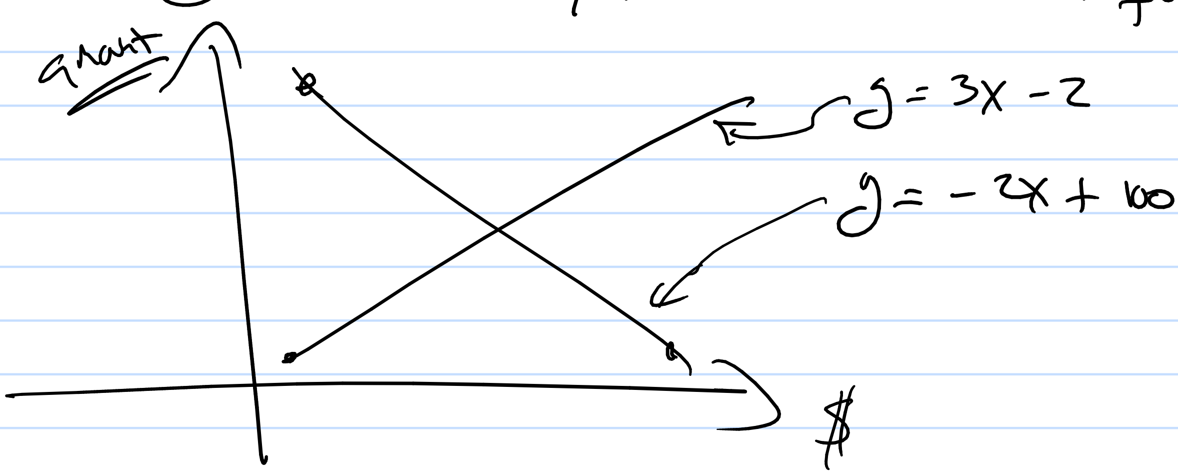
$y = f(x)$

1. polynomials
2. rationals
3. radicals
4. exponentials
5. logs
6. Trig functions

- Science
- Business / Econ
- Statistics
- Optimization / Programming
- Linear Algebra

Need More Skills

1. Solve Systems of Linear Equations.



two variables $\quad a_1 x_1 + a_2 x_2 = b \quad \leftarrow$ 2 var. linear eqn

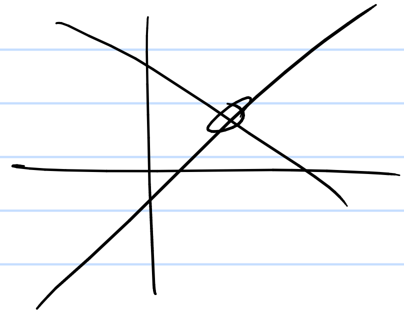
three variables $\quad a_1 x_1 + a_2 x_2 + a_3 x_3 = b \quad \leftarrow$ 3 var. linear eqn.

$\vdots$

n-variables $\quad a_1 x_1 + a_2 x_2 + \cdots + a_n x_n = b$

ex System of 2 eqn's with 2 variables

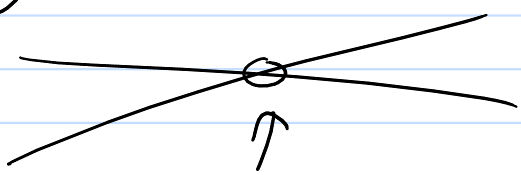
$$\left[\begin{array}{l} 3x + y = 1 \\ -x + 2y = 2 \end{array}\right.$$



Solve? Says find intersection

Possible Answers

#1



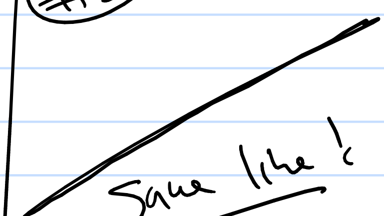
1 intersection.

#2

parallel!

no ans.

#3



Same line!

∞ sol'ns

Solve Systems of eqns

$\boxed{\text{substitution}}$

Soln $\boxed{(0,1)}$

$3x + y = 1$

$-x + 2y = 2$

(1) pick an eqn and a variable

$y = 1 - 3x$

(2) plug variable expression into other eqn(s)

$-x + 2(1-3x) = 2$

$-7x + 2 = 2 \rightarrow x = 0$

(3) back substitute

$y = 1 - 3(0) = 1$

$$\begin{cases} 3x + y = 1 \\ -x + 2y = 2 \end{cases}$$

4

Elimination

① Add multiples of two eqn's so that one variable is eliminated.

r_1 : $3x + y = 1$

$3 \circ r_2$

$3r_2$: $-3x + 6y = 6$

$7y = 7 \rightarrow \underline{y = 1}$

② backsolve r_1 $3x + y = 1$

$3x + 1 = 1$

$x = 0$

$\boxed{\text{Soln } (0,1)}$

$$\begin{cases} x + y - z = 1 \\ 2x - y + 3z = 2 \\ -x + 2y - z = 0 \end{cases}$$

$-2r_1$ $-2x - 2y + 2z = -2$

$+r_2$ $2x - y + 3z = 2$

$\boxed{-3y + 5z = 0}$

r_1 $x + y - z = 1$

$+r_3$ $-x + 2y - z = 0$

$\boxed{3y - 2z = 1}$

$\boxed{y = 5/9}$

$$\begin{cases} -3y + 5z = 0 \\ 3y - 2z = 1 \end{cases}$$

$r_1 + r_3$ $3z = 1$

$\boxed{z = 1/3}$

in $x + y - z = 1$ $\quad z = 1/3 \quad y = 5/9$

so $x + \frac{5}{9} - \frac{1}{3} = 1$

$x + \frac{2}{9} = 1 \qquad x = 7/9$

Soln $\boxed{(7/9,\ 5/9,\ 1/3)}$