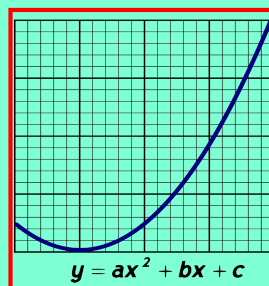


Math 125
Fall 2021
Lecture 47

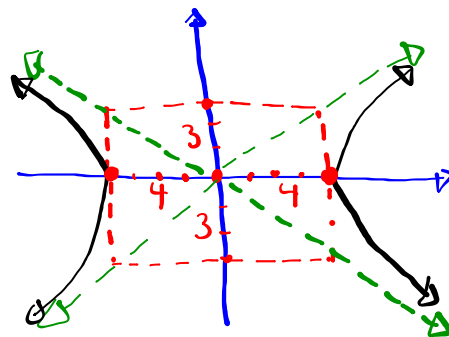


Class QZ 36

Given $\frac{x^2}{16} - \frac{y^2}{9} = 1$

1) Center $(0,0)$ ✓

2) Draw a **complete**
Graph



3) Give All intercepts: x-Int $\begin{matrix} (4,0) \\ (-4,0) \end{matrix}$ y-Int None

Solve by Square-Root Method:

$$1) (3x-2)^2 = 18$$

$$3x-2 = \pm\sqrt{18}$$

$$3x = 2 \pm \sqrt{9\sqrt{2}}$$

$$x = \frac{2}{3} \pm \frac{\cancel{3}\sqrt{2}}{\cancel{3}}$$

$$\boxed{x = \frac{2}{3} \pm \sqrt{2}}$$

$$\left\{ \frac{2}{3} \pm \sqrt{2} \right\}$$

$$2) (2x+1)^2 = -50$$

$$2x+1 = \pm\sqrt{-50}$$

$$2x = -1 \pm \sqrt{25\sqrt{2}\sqrt{-1}}$$

$$\boxed{x = \frac{-1}{2} \pm \frac{5\sqrt{2}}{2} i}$$

$$\left\{ \frac{-1}{2} \pm \frac{5\sqrt{2}}{2} i \right\}$$

Make a perfect-square

$$1) x^2 + 10x + 5^2 = (x+5)^2 = x^2 + 10x + 25$$

$$\frac{1}{2} \cdot 10 = 5$$

$$2) x^2 - 9x + \left(\frac{9}{2}\right)^2 = \left(x - \frac{9}{2}\right)^2 = x^2 - 9x + \frac{81}{4}$$

$$\frac{1}{2} \cdot 9 = \frac{9}{2}$$

$$3) x^2 + \frac{5}{3}x + \left(\frac{5}{6}\right)^2 = \left(x + \frac{5}{6}\right)^2 = x^2 + \frac{5}{3}x + \frac{25}{36}$$

$$\frac{1}{2} \cdot \frac{5}{3} = \frac{5}{6}$$

$$4) x^2 - \frac{4}{5}x + \left(\frac{2}{5}\right)^2 = \left(x - \frac{2}{5}\right)^2 = x^2 - \frac{4}{5}x + \frac{4}{25}$$

$$\frac{1}{2} \cdot \frac{4}{5} = \frac{2}{5}$$

Solve by Completing the Square method

$$x^2 - 6x - 11 = 0$$

$$x^2 - 6x + (3)^2 = 11 + (3)^2$$

$$\frac{1}{2} \cdot 6 = 3$$

$$(x - 3)^2 = 20$$

By S.R.M.

$$x - 3 = \pm \sqrt{20}$$

$$x = 3 \pm \sqrt{4\sqrt{5}}$$

$$x = 3 \pm 2\sqrt{5}$$

$$\left\{ 3 \pm 2\sqrt{5} \right\}$$

Solve by the Completing the Square method:

$$x^2 + 8x + 41 = 0$$

$$x^2 + 8x + (4)^2 = -41 + 4^2$$

$$(x + 4)^2 = -25$$

By S.R.M.

$$x + 4 = \pm \sqrt{-25}$$

$$x = -4 \pm 5i$$

$$\left\{ -4 \pm 5i \right\}$$

Solve by Completing the Square Method:

$$2x^2 - 5x - 3 = 0$$

$$\frac{2}{2}x^2 - \frac{5}{2}x - \frac{3}{2} = 0$$

$$x^2 - \frac{5}{2}x + \left(\frac{5}{4}\right)^2 = \frac{3}{2} + \left(\frac{5}{4}\right)^2$$

$$\frac{1}{2} \cdot \frac{5}{2} = \frac{5}{4}$$

$$\left(x - \frac{5}{4}\right)^2 = \frac{49}{16}$$

Use S.R.M.

$$x - \frac{5}{4} = \pm \sqrt{\frac{49}{16}}$$

$$x = \frac{5}{4} \pm \frac{7}{4}$$

$$\left\{-\frac{1}{2}, 3\right\}$$

$$x = \frac{5}{4} + \frac{7}{4}$$

$$= \frac{12}{4}$$

$$\boxed{x=3}$$

$$x = \frac{5}{4} - \frac{7}{4}$$

$$= -\frac{2}{4}$$

$$\boxed{x = -\frac{1}{2}}$$

Hint: Make leading

Coef. 1.

Divide by 2

$$\frac{3}{2} + \frac{25}{16}$$

$$= \frac{3 \cdot 8}{2 \cdot 8} + \frac{25}{16}$$

$$= \frac{24}{16} + \frac{25}{16} = \frac{49}{16}$$

Solve by Completing the Square method:

$$4x^2 + 4x + 17 = 0$$

Divide by 4 and Simplify

$$x^2 + x + \frac{17}{4} = 0$$

$$x^2 + x + \left(\frac{1}{2}\right)^2 = -\frac{17}{4} + \left(\frac{1}{2}\right)^2$$

$$\frac{1}{2} \cdot 1 = \frac{1}{2} \quad \left(x + \frac{1}{2}\right)^2 = -4$$

by S.R.M.

$$x + \frac{1}{2} = \pm \sqrt{-4}$$

$$\boxed{x = -\frac{1}{2} \pm 2i}$$

Use hint from last example.

$$-\frac{17}{4} + \frac{1}{4} =$$

$$-\frac{16}{4} = -4$$

$$\left\{-\frac{1}{2} \pm 2i\right\}$$

Given $3x^2 + 7x - 2 = 0$ $ax^2 + bx + c = 0$

1) $a=3$ $b=7$ $c=-2$

2) Evaluate $b^2 - 4ac = 7^2 - 4(3)(-2)$
 $= 49 + 24 = 73$

3) Solve using Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-7 \pm \sqrt{73}}{2(3)} = \frac{-7 \pm \sqrt{73}}{6}$$

$$\left\{ \frac{-7 \pm \sqrt{73}}{6} \right\}$$

Given $9x^2 - 12x + 20 = 0$

1) $a=9$ $b=-12$ $c=20$

2) Evaluate $b^2 - 4ac = (-12)^2 - 4(9)(20)$
 Discriminant \uparrow $= 144 - 720 = -576$

3) Use Quadratic Formula to Solve.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-12) \pm \sqrt{-576}}{2(9)} = \frac{12 \pm \sqrt{576} \sqrt{-1}}{18}$$

$$= \frac{12 \pm 24i}{18} = \frac{12}{18} \pm \frac{24}{18}i$$

$$= \frac{2}{3} \pm \frac{4}{3}i \quad \left\{ \frac{2}{3} \pm \frac{4}{3}i \right\}$$

Given: $4x^2 + 25 = 0$

1) $a=4$ $b=0$ $c=25$

2) Evaluate $b^2 - 4ac = 0^2 - 4(4)(25) = -400$

3) Solve by Quadratic Formula $\left\{ \pm \frac{5}{2}i \right\}$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-0 \pm \sqrt{-400}}{2(4)} = \frac{\pm \sqrt{400} \sqrt{-1}}{8} = \pm \frac{20}{8} i = \boxed{\pm \frac{5}{2} i}$$

Class QZ 37

Given $\frac{(y+3)^2}{9} - \frac{x^2}{9} = 1$

1) Center $(0, -3)$

2) Draw a Complete Graph

3) x -Int $(0, 0)$ 4) y -Int $(0, 0), (0, -6)$

