M-A2 Algebra 2 Week 27 4/22

How many real solutions?

1.) $x^2 + 7x - 10 = -3$

$+3 \quad +3$

$x^2 + 7x - 7 = 0$

$a = 1 \quad b = 7 \quad c = -7$

$b^2 - 4ac$

$7^2 - 4(1)(-7)$

$49 + 28 = 77$

2 real solutions

Quadratic formula

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

h

$h = \frac{-b}{2a} \rightarrow$ vertex

discriminant

How many real solutions

real zeros

$b^2 - 4ac > 0 \rightarrow$ 2

$b^2 - 4ac = 0 \rightarrow$ 1

$b^2 - 4ac < 0 \rightarrow$ 0

How many reals?

2.) $-4x^2 - 8x - 14 = -10$

$+10 \quad +10$

$\Rightarrow -4x^2 - 8x - 4 = 0$

$a = -4 \quad b = -8 \quad c = -4$

$[b^2 - 4ac]$

$(-8)^2 - 4(-4)(-4)$

$[64 - 64] = 0$

1 real solution

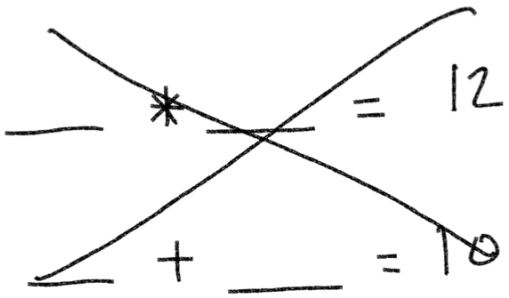
$x^2 = -10x - 12$

$+10x + 12 \quad +10x + 12$

$x^2 + 10x + 12 = 0$

$a = 1 \quad b = 10 \quad c = 12$

Find the zeros



$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-10 \pm \sqrt{(10)^2 - 4(1)(12)}}{2(1)}$$

$$\frac{-10 \pm \sqrt{100 - 48}}{2}$$

$$\frac{-10 \pm \sqrt{52}}{2}$$

$\sqrt{52}$

$\sqrt{4} \quad \sqrt{13}$

$2\sqrt{13}$

$$\frac{-10 \pm 2\sqrt{13}}{2} \quad \begin{matrix} \div 2 \\ \div 2 \end{matrix}$$

$$\frac{-10 \pm 2\sqrt{13}}{2 \div 2} = \boxed{-5 \pm \sqrt{13}}$$

$-5 + \sqrt{13}, \quad -5 - \sqrt{13}$

H → average of zeros

$$\frac{-5 + \sqrt{13} + (-5) - \sqrt{13}}{2}$$

$$\frac{-10}{2} = -5$$

$6x^2 + 8x = -10$

$+10 \quad +10$

$6x^2 + 8x + 10 = 0$

Find the zeros.

$a = 6 \quad b = 8 \quad c = 10$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-8 \pm \sqrt{(8)^2 - 4(6)(10)}}{2(6)}$$

$$\frac{-8 \pm \sqrt{64 - 240}}{12}$$

$$\frac{-8 \pm \sqrt{-176}}{12}$$

$\sqrt{-176}$

$\sqrt{-1} \quad \sqrt{4} \quad \sqrt{44}$

$i \qquad \sqrt{4} \quad \sqrt{11}$

$i \cdot \sqrt{4} \cdot \sqrt{4} \cdot \sqrt{11}$

$4i\sqrt{11}$

$$\frac{-8 \pm 4i\sqrt{11}}{12}$$ ($\div 4$, $\div 4$)

$$\frac{-2 \pm i\sqrt{11}}{3}$$

$2x^2 = 8x - 12$

$-8x + 12 \quad -8x \quad +12$

$2x^2 - 8x + 12 = 0$

$a = 2 \quad b = -8 \quad c = 12$

$\sqrt{-32}$

$\sqrt{-1} \quad \sqrt{16} \cdot \sqrt{2}$

$\downarrow \quad \downarrow$

$i \cdot 4\sqrt{2}$

Find the zeros

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-(-8) \pm \sqrt{(-8)^2 - 4(2)(12)}}{2(2)}$$

$$\frac{8 \pm \sqrt{64 - 96}}{4}$$

$$\frac{8 \pm \sqrt{-32}}{4}$$

$\div 4 \quad \div 4$

$$\frac{8 \pm 4i\sqrt{2}}{4 \div 4}$$

$$\boxed{2 \pm i\sqrt{2}}$$

$i = \sqrt{-1}$

$i^2 = i \cdot i = \sqrt{-1} \cdot \sqrt{-1} = -1$

$i^3 = i^2 \cdot i = -1 \cdot i = -i$

$i^4 = i^2 \cdot i^2 = -1 \cdot -1 = 1$

$i^5 = i^4 \cdot i = 1 \cdot i = i$

$i = i \qquad i^5 = i$

$i^2 = -1 \qquad i^6 = -1$

$i^3 = -i \qquad i^7 = -i$

$i^4 = 1 \qquad i^8 = 1$

$\sqrt{4} \cdot \sqrt{4} = 4$

$2 \cdot 2 = 4$

$\sqrt{11} \cdot \sqrt{11} = 11$

$\sqrt{x} \cdot \sqrt{x} = x$

$-i = -\sqrt{-1}$

Complex Numbers

$3^2 = 3 \cdot 3$

FOIL!

$(-5+4i)^2 = (-5+4i)(-5+4i)$

$25 - 20i - 20i + 16i^2$ $\quad i^2 = -1$

$16(-1)$

$25 - 20i - 20i - 16$

$25 - 16$

$9 - 40i$

real, imaginary

FOIL

"FIVE"

$(3-4i)(-3-5i)$

$20(i^2) = 20(-1)$

$-9 - 15i + 12i + 20i^2$

$-4i \cdot -5i$

$+20i^2$

$-9 - 15i + 12i - 20$

$\boxed{-29 - 3i}$