Math 612

Ch 5.1-5.5

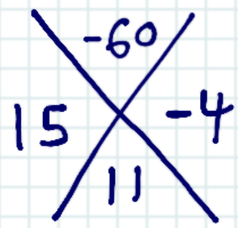
Review

Solve by factoring #1

$$6x^2 + 11x = 10$$

$$6x^2 + 11x - 10 = 0$$

Use A-C method



10	-6	= 4	
12	-5	= 7	
15	-4	= 11	✓

$$6x^2 - 4x + 15x - 10 = 0$$

2 things to note, A-C helps us split middle term to 2 terms. When one term is negative, here, -4, use it first, it makes factoring easy.

$$2x(3x-2) + 5(3x-2)$$

$$(3x-2)(2x+5) = 0$$

$$3x - 2 = 0 \qquad 2x + 5 = 0$$

$$3x = 2 \qquad 2x = -5$$

$$x = 2/3 \qquad x = -2.5$$

2. Eq 1 $2x^2 + 7x + 10 = 0$

Eq 2 $-5x^2 + 4x + 3 = 0$

a) $b^2 - 4ac = 49 - (4 \cdot 2 \cdot 10) = -31$ negative

there are no real solutions.

b) $b^2 - 4ac = 16 - (4 \cdot -5 \cdot 3) = 76$ positive but not a square

there are 2 roots but they are irrational.

c) a negative discriminant indicates the graph doesn't intersect the x axis, no real roots. A positive discriminant that isn't a square results in 2 irrational roots

3. $3x^2 - 18x + 11 = 0$

$$3x^2 - 18x = -11$$

$$3(x^2 - 6x + 9) = -11 + 27$$

$$3(x-3)^2 = 16$$

$$(x-3)^2 = \frac{16}{3}$$

$$x - 3 = \pm \frac{4}{\sqrt{3}} \qquad \frac{4}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{4\sqrt{3}}{3}$$

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

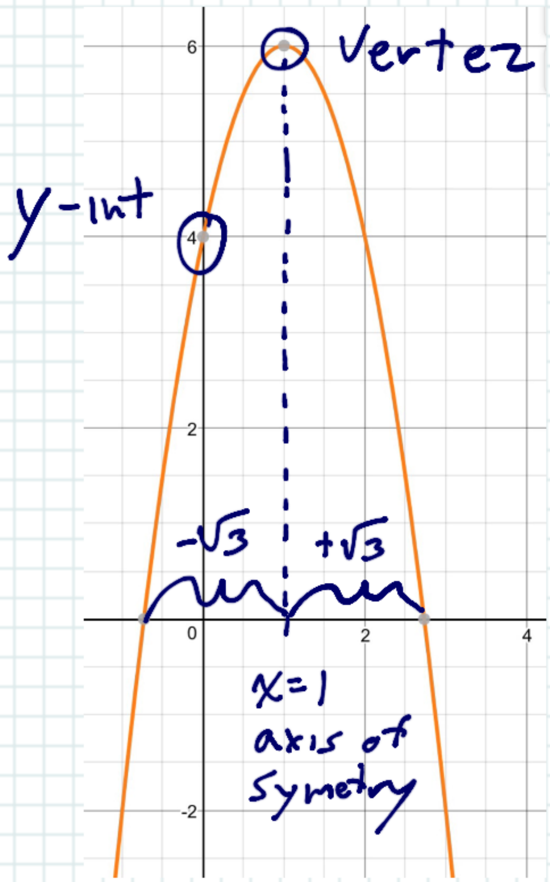
5. $24x^2 + 23x - 12 = 0$

$$x = \frac{-23 \pm \sqrt{23^2 - (4)(24)(-12)}}{2(24)}$$

$$x = \frac{-23 \pm 41}{48} = \frac{-64}{48} \text{ or } \frac{18}{48}$$

$$-4/3 \text{ or } 3/8$$

4 $y=-2(x-1)^2+6$



y-int occurs @ $x=0$

$y=-2(0-1)^2+6=4$

the equation was given in vertex form,

$y=a(x-h)^2+k$

vertex is $(1,6)$

axis of symmetry is @ $x=1$

symmetric point $(2,4)$

Solve for roots $0=-2(x-1)^2+6$

$-6=-2(x-1)^2$

$3=(x-1)^2$

$\pm\sqrt{3}=x-1$

$x=1\pm\sqrt{3}$

7.a. i^{2011} Remember, $i = \sqrt{-1}$ so

$i = i$

$i^2 = -1$

$i^3 = -i$

$i^4 = 1$

Since $x^{100} = (x^4)^{25}$, $i^{100} = 1$ and so $i^{2011} = i^{11} = i^8 \cdot i^3$ and $i^3 = -i$. When you see i^x, you can just keep 2 digits, eg $i^{3123} = i^{23}$ and then remove any remaining multiple of 4.

b. $(1+i)(3+4i)$ use foil or grid method.

	1	i
3	3	$3i$
$4i$	$4i$	-4

$= \boxed{-1+7i}$

c. $(-2+5i)-(7-8i)$

$-2-7=-9$ $5i-(-8i)=13i$

$\boxed{-9+13i}$

d. $\dfrac{5-6i}{3+4i} \cdot \dfrac{3-4i}{3-4i}$ Multiply numerator & denominator by conjugate

	3	$-4i$
5	15	$-20i$
$-6i$	$-18i$	-24

$$= \frac{-9-38i}{9+16} = -\frac{9}{25} - \frac{38}{25}i$$

Note: $(a+b)(a-b) = a^2 - b^2$ so

$$(a+bi)(a-bi) = a^2 + b^2$$