Quadratic Formula for $Ax^2+Bx+C=0$

$$X=\frac{-B\pm\sqrt{B^2-4AC}}{2A}$$

11 Classwork 11 MAT 1275 Professor Chiu

Name: _____

1. Solve $x^2 + 2x = 48$

Using formula: $x^2+2x-48=0$

$A=1,\ B=2,\ C=-48$

$$X=\frac{-2\pm\sqrt{4-4\cdot1\cdot(-48)}}{2}$$

$4+192=196=14^2$

$$=\frac{-2\pm\sqrt{14^2}}{2}$$

$$=\frac{-2\pm14}{2}$$

$\frac{-2+14}{2}=\frac{12}{2}=6$

$\frac{-2-14}{2}=\frac{-16}{2}=-8$

OR

Factor directly:

$x^2+2x-48=0$

$x\quad -6$

$x\quad +8$

$\Rightarrow (x-6)(x+8)=0$

$\Rightarrow (x-6)=0$ or $(x+8)=0$

$+6\ +6 \qquad -8\ -8$

$\Rightarrow$ **$x=6$ or $x=-8$.**

2. Solve $5x^2 + 37x + 14 = 0$

Using formula

$A=5,\ B=37,\ C=14$

$$X=\frac{-37\pm\sqrt{37^2-4\cdot5\cdot14}}{10}$$

$1369-280=1089=33^2$

$$=\frac{-37\pm\sqrt{33^2}}{10}$$

$$=\frac{-37\pm33}{10}$$

$\frac{-37+33}{10}=\frac{-4}{10}=-\frac{2}{5}$

$\frac{-37-33}{10}=\frac{-70}{10}=-7$

OR

Factor directly

$5x^2+37x+14=0$

$x\quad +7$

$5x\quad +2$

$\Rightarrow (x+7)(5x+2)=0$

$\Rightarrow x+7=0$ or $5x+2=0$

$-7\ -7 \qquad -2\ -2$

$\Rightarrow x=-7$ or $\frac{5x}{5}=\frac{-2}{5}$

$\Rightarrow$ **$x=-7$ or $x=-\frac{2}{5}$**

- Complex number: $A+Bi$ (A: real part, B: imaginary part)
- $i=\sqrt{-1}$
- $i^2=\sqrt{-1}\cdot\sqrt{-1}=-1$

3. Simplify:

"real part" + "real part" & "imaginary part" + "imaginary part"

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

$=(3+5)+(i-2i)$

$=8-i$

4. Simplify:

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

$=15+2+(5i-6i)$

$=17-i$

	3	i
5	15	$5i$
$-2i$	$-6i$	$-2i^2$

$-2i^2 \overset{(i^2=-1)}{=} -2\cdot(-1)=2$

5. Divide:

- Rationalize the denominator: $\frac{3+i}{5-2i}=\frac{(3+i)(5+2i)}{(5-2i)(5+2i)}$

Using conjugate of "$5-2i$": $5+2i$

$(5-2i)(5+2i)=25+4+10i-10i$

$=29$

it became "real"! (without "i")

$=\frac{15-2+5i+6i}{29}$

$=\frac{13+11i}{29}$

$=\frac{13}{29}+\frac{11}{29}i$

	5	$-2i$
5	25	$-10i$
$2i$	$10i$	$-4i^2$

$-4i^2 \overset{(i^2=-1)}{=} -4\cdot(-1)=4$

	3	i
5	15	$5i$
$2i$	$6i$	$2i^2$

$2i^2=2\cdot(-1)=-2$