MT- study notes CH2-1

CHAPTER 2: Absolute value + Radical equations

absolute value ⇒ | |

$|-3| = 3$

$|2-4| = |-2| = 2$

* when you remove | | result must be positive.

so....

$|-25+10| - 3|2-8|$

do inside 1st

$= |-15| - 3|-6|$

* this means -3 times the result of the absolute value of $|2-8|$

$|-6| = +6$

$= 15 - 3(+6)$

$= 15 - 18$

$= -3$

radical equations

remember $\sqrt{81} = \sqrt{9 \times 9} = 9$

$\sqrt{80}$

8 10

2 4 2 5

2 2

1 group of 2; 2 groups of 2

* find groups of 2 then remove to outside

$\rightarrow 2 \times 2\sqrt{5}$ (left in because no pair)

$= 4\sqrt{5}$

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rationalize the denominator:
(aka get the $\sqrt{}$ off the bottom)

Part 1

$\frac{2\sqrt{3}}{\sqrt{2}}$ * multiply by what the radical is on the bottom (→ both top + bottom)

$\frac{2\sqrt{3}}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{2\sqrt{6}}{\sqrt{4}} = \frac{2\sqrt{6}}{2} = \text{reduce} = \sqrt{6}$

* remember when adding radicals $\sqrt{}$ ← has to be the same

So... $2\sqrt{3} + 4\sqrt{2} + 7\sqrt{3} - 2\sqrt{2}$

add add.

add

$2\sqrt{3} + 7\sqrt{3} + 4\sqrt{2} - 2\sqrt{2}$

$= 9\sqrt{3} + 2\sqrt{2}$

* NOTE
$\sqrt{x} + \sqrt{x} + \sqrt{y}$
$= 2\sqrt{x} + \sqrt{y}$

* when multiplying or dividing radicals #'s with #'s, radicals w/ radicals.

mult $4\sqrt{2} \times 3\sqrt{5} = 4 \times 3$ and $\sqrt{2} \times \sqrt{5}$

$= 12\sqrt{10}$

divide $\frac{4\sqrt{6}}{2\sqrt{3}} = 4 \div 2$ and $\sqrt{6} \div \sqrt{3}$ or $\frac{4}{2}\sqrt{\frac{6}{3}}$

$= 2\sqrt{2}$

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Rationalize the denominator

Part 2

* when you have + or − on bottom you must do the opposite.

$$\frac{2\sqrt{3}+\sqrt{2}}{5\sqrt{2}-\sqrt{3}}$$

* mult by opposite sign on bottom (both top + bottom)
(ex $5\sqrt{2}-\sqrt{3}$ opp sign $=5\sqrt{2}+\sqrt{3}$)

$$\frac{2\sqrt{3}+\sqrt{2}}{5\sqrt{2}-\sqrt{3}} \times \frac{(5\sqrt{2}+\sqrt{3})}{(5\sqrt{2}+\sqrt{3})}$$

$$= \frac{10\sqrt{6}+2\sqrt{9}+10\sqrt{4}+\sqrt{6}}{25\sqrt{4}+5\sqrt{6}-5\sqrt{6}-\sqrt{9}}$$

$$= \frac{10\sqrt{6}+6+20+\sqrt{6}}{50-3} = \frac{11\sqrt{6}+26}{47}$$

To solve a radical equation

① get the radical alone on one side

* remember you can't take anything out of radical before it is squared

$$\sqrt{2x+3}-2=3$$

$$+2 \quad +2$$

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

* once alone ( )^2 both sides

$$(\sqrt{2x+3})^2=(5)^2 \Rightarrow 2x+3=25$$

$$-3 \quad -3$$

$$2x=22 \quad x=11$$

* now it's just algebra!!

NOTE
* once you are done check if it works (if $\sqrt{-}$ → doesn't work, no answer!)

$\sqrt{2(11)+3}-2=3$

$\sqrt{25}-2=3$

$5-2=3$ ✓

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To solve an absolute value equation

* You have to make it positive & then make it negative
pretend | | are brackets & put a + then - in front. (distribute)

STEP 1 $|2x+3|=25$

positive

$+(2x+3)=25$

$2x+3=25$

$-3 \quad -3$

$2x=22$

$x=11$

negative

$-(2x+3)=25$

$-2x-3=25$

$+3 \quad +3$

$\frac{-2x}{-2}=\frac{28}{-2}$

$x=-14$

STEP 2 check if it works

$|2(11)+3|=25$

$|22+3|=25$

$|25|=25$

$25=25$

$|2(-14)+3|=25$

$|-28+3|=25$

$|-25|=25$

$25=25$

both work ✓

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Radical Equations Part 2

$\sqrt{-3x+7} = \sqrt{-2x+9}$ * ( )^2 both sides

$(\sqrt{-3x+7})^2 = (\sqrt{-2x+9})^2$

$-3x+7 = -2x+9$
$+2x \quad +2x$

$-x+7 = 9$
$-7 \quad -7$

$-x = 2$
$x = -2$ * now check if it works

$\sqrt{-3(-2)+7} = \sqrt{-2(-2)+9}$

$\sqrt{6+7} = \sqrt{+4+9}$

$\sqrt{13} = \sqrt{13}$
works ✓

example of no real roots:

NO REAL ROOTS

$\sqrt{3x-1} + 5 = 2$
$-5 \quad -5$

$(\sqrt{3x-1})^2 = (-3)^2$

$3x-1 = 9$
$+1 \quad +1$

$\frac{3x}{3} = \frac{10}{3}$ $x = \frac{10}{3}$

check

$\sqrt{3(\frac{10}{3})-1} + 5 = 2$

$\sqrt{10-1} + 5 = 2$

$3 + 5 \neq 2$

∴ NO REAL ROOTS