9/17 Precal, Quiz 7

1. $4x - 10 = 0$ $\quad 4x = 10$

$x = \frac{10}{4} = \frac{5}{2}$

2. $3(x+2) = x - 8$

$3x + 6 = x - 8$ $\quad -x$

$2x + 6 = -8$ $\quad -6$

$2x = -14$ $\quad \div 2$

$x = -14/2 = -7$

3. $x^2 + 5x - 2 = x^2 - 3x + 10$ $\quad -x^2$

$5x - 2 = -3x + 10$ $\quad +3x$

$8x - 2 = 10$ $\quad +2$

$8x = 12$ $\quad x = \frac{12}{8} = \frac{3}{2}$

(4) $\boxed{\frac{1}{x+2}} - \frac{5}{2x-5} = 0$

$$\frac{1(2x-5) - 5(x+2)}{(x+2)(2x-5)} = 0$$

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

$$2x - 5 - 5x - 10 = 0$$

$$-3x = 15$$

$$x = -\frac{15}{3} = -5$$

maybe

Exam 1 → Sept 29

Last time quadratic equations

$ax^2 + bx + c = 0$

factor

complete square

quadratic formula

§1.6 other types

Ex 0

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

$x(x^2 + 5x + 4) = 0$

FACTOR

$x(x+4)(x+1) = 0$

$\therefore x = 0, -1, -4$

Reduce to quadratic

(a)

$y = x^2$

$x^4 - 6x^2 + 5 = 0$

$y^2 - 6y + 5 = 0$

$(y-5)(y-1) = 0$

$y = 1, 5$

$x^2 = 1 \quad 5$

$x = \pm 1, \pm\sqrt{5}$

(b) $x^6 - 6x^3 + 5 = 0$

$y = x^3$

$y^2 - 6y + 5 = 0$

1

$y = 1, 5$

$\therefore \quad x^3 = 1, 5$

$x = \sqrt[3]{1} = 1$

$x = \sqrt[3]{5}$

Radical equations

(a) $\sqrt{4x+5} - x = 2$

$x = 1$
$x = -1$

strategy: get rid $\sqrt{}$

$+x$

$\sqrt{4x+5} = x+2$

Square

$4x+5 = (x+2)^2$

$4x+5 = x^2+4x+4$

$-4x=-5$

$0 = x^2 - 1$

$x = \pm 1$

Subtle point: squaring both sides can add new solution

$y = 1 \Rightarrow y^2 = 1^2 = 1$

$\Downarrow$

$y = 1$ $\quad$ $y = \pm 1$

need to check answer

both $x = \pm 1$ work

(b) $\sqrt{x+1} + 2x = 8$

$\sqrt{x+1} = 8 - 2x$

$\frac{5}{2} + \frac{3}{2}$ $\quad$ 8

$\frac{21}{4}$ $\frac{26}{2}$ 13 ± 8

$x+1 = 64 - 32x + 4x^2$

$0 = \underset{c}{63} - \underset{b}{33}x + \underset{a}{4}x^2$

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

$\frac{33 \pm \sqrt{1089 - 4(4)(63)}}{2 \cdot 4}$

$3 \cdot 11$

$9 \cdot 121 =$

$\frac{33 \pm \sqrt{1089 - 1008}}{8} =$

$\frac{33 \pm \sqrt{81}}{8} = \frac{33 \pm 9}{8}$

$\frac{42}{8}$ $\frac{24}{8}$

$\boxed{\frac{21}{4}, 3}$

$\boxed{x=3}$ OK ✓

but $x = \frac{21}{4}$ tick

Rational equality

$$\frac{1}{x-2} = \frac{3}{x+2} - \frac{6x}{x^2-4}$$

$$\frac{6x}{x^2-4} - \frac{3}{x+2} + \frac{1}{x-2} = 0$$

$$\frac{6x}{x^2-4} - \frac{3(x-2)}{x^2-4} + \frac{(x+2)}{x^2-4} = 0$$

$$6x - 3(x-2) + (x+2) = 0$$

$$6x - 3x + 6 + x + 2 = 0$$

$$4x + 8 = 0$$

$$4x = -8$$

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

$-\frac{1}{4} \neq$ DNE Facts,

$\therefore$ no solution

Absolute Value

(a) $|2x-5| = 11$

Since $|y| = \begin{cases} y & y \geq 0 \\ -y & y < 0, \end{cases}$

need to solve 2 equations

$2x-5 = 11$

$2x-5 = -11$

$2x = 16 \Rightarrow x = \frac{16}{2} = 8$

↳ $2x = -6 \Rightarrow x = -\frac{6}{2} = -3$

(h) $|x^2+6x| = 3x+18$

$x^2+6x = 3x+18 \Rightarrow$

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

$(x+6)(x-3)$

$x = -6, 3$

$x^2+6x = -3x-18$

$x^2+9x+18 = 0$

$(x+3)(x+6)$

$x = -3, -6$

i.7 $x > 3 \rightarrow (3, \infty)$

unbounded interval

$-1 < x \leq 1$ $(-1, 1]$ bounded

Solving linear inequalities

Ex1 (a) $3x+2 > x+5$ $-x$

$2x+2 > 5$ -2

$2x > 3$ $\div 2$

$x > 3/2$

$(3/2, \infty)$

(b) $-10 \leq 2-4x < 5$ -2

$-12 \leq -4x < 3$ $\div 4$

$-3 \leq -x < 3/4$ $\div (-1)$

$-1 < 0$

$3 \geq x > -3/4$

$(-3/4, 3]$

Also $-3 \leq -x < 3/4$

$x - 3 \leq 0 < 3/4 + x$

$x \leq 3$ $\quad -3/4 < x$

(c) $-1 \leq \frac{-3x+5}{7} \leq 2 \quad \times 7$

$-7 \leq -3x+5 \leq 14 \quad -5$

$-12 \leq -3x \leq 9$

$4 = \frac{-12}{-3} \geq x \geq \frac{9}{-3} \geq -3$

$[-3, 4]$