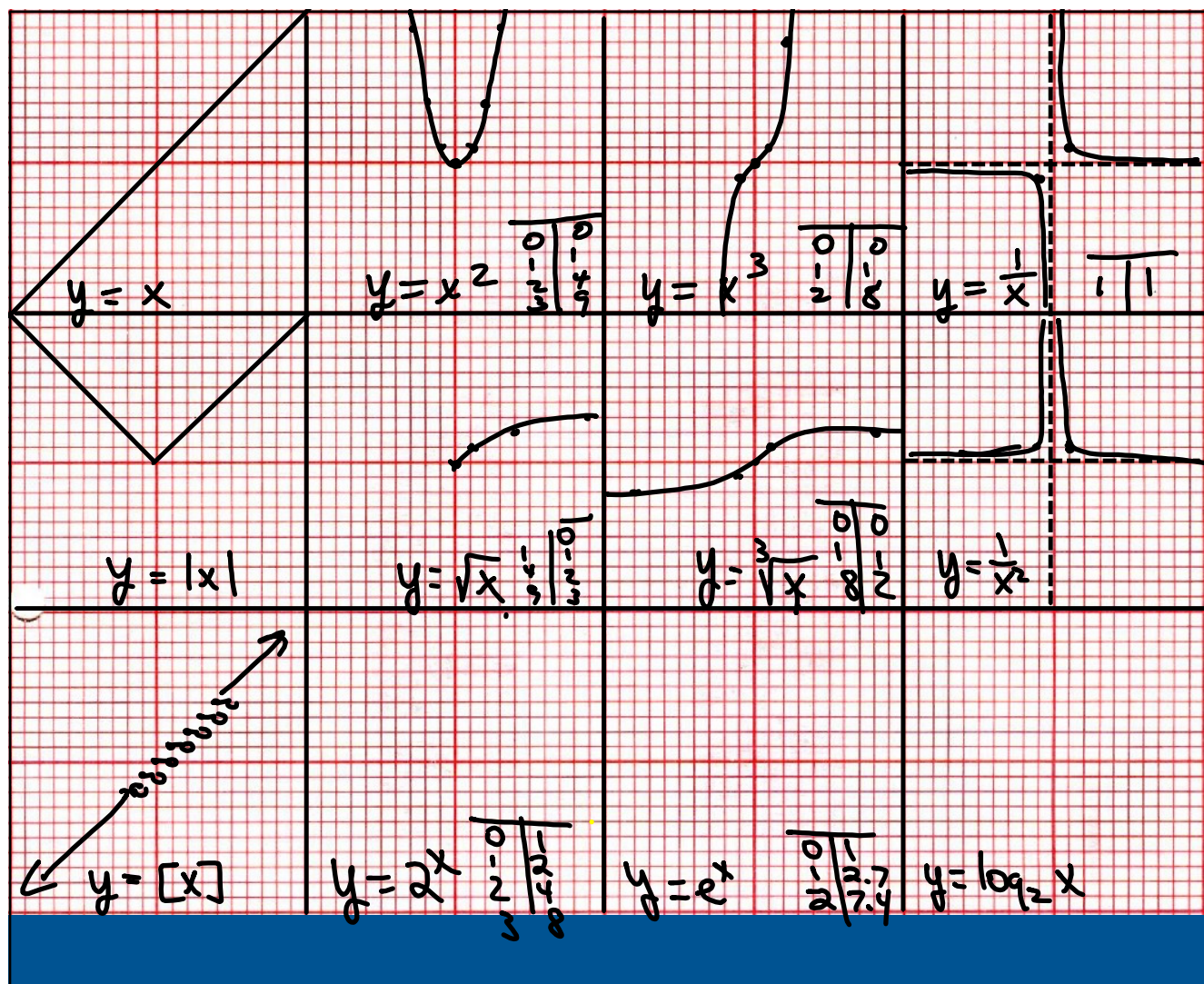




$$\sqrt{2x+1} - \sqrt{x-3} = 2$$

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

$$(2 + \sqrt{x-3})(2 + \sqrt{x-3})$$

1) Isolate a root

2) Square both sides
Repeat.

$$2x+1 = 4 + 2\sqrt{x-3} + 2\sqrt{x-3} + x-3$$

$$\begin{array}{r} 2x+1 = 1+x+4\sqrt{x-3} \\ -x \quad -1 \quad -1 \quad -x \end{array}$$

$$(x)^2 = (4\sqrt{x-3})^2$$

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

$$x^2 = 16x - 48$$

$$x^2 - 16x + 48 = 0$$

$$(x-4)(x-12) = 0$$

$$x=4 \quad x=12$$

$$x=4 \quad \sqrt{9} - \sqrt{1} = 2$$

$$3-1=2 \checkmark$$

$$x=12 \quad \sqrt{25} - \sqrt{9} = 2$$

$$5-3=2 \checkmark$$

Solve

$$14(b) \quad x^4 - 4x^3 - 7x^2 + 34x - 24 = 0$$

$$\underline{\hspace{2cm}} \mid x=1$$

$$1 - 4 - 7 + 34 - 24 = 0$$

$$\begin{array}{ll} \pm 1 & \pm 24 \\ \pm 2 & \pm 12 \\ \pm 3 & \pm 8 \\ \pm 4 & \pm 6 \end{array}$$

$$\begin{array}{r|rrrrr} 1 & 1 & -4 & -7 & 34 & -24 \\ & & 1 & -3 & -10 & 24 \\ \hline & 1 & -3 & -10 & 24 & 0 \end{array}$$

$x=1$
 $x-1$
 multiply
 * box

$$(x-1)(x^3 - 3x^2 - 10x + 24)$$

$$\underline{\hspace{2cm}} \mid x=2 \quad 0$$

$$\begin{array}{r|rrrr} 2 & 1 & -3 & -10 & 24 \\ & & 2 & -2 & -24 \\ \hline & 1 & -1 & -12 & 0 \end{array}$$

$$(x-1)(x-2)(x^2 - x - 12)$$

$$(x-4)(x+3)$$

$$\boxed{x=1, 2, -3, 4}$$

Rational Func.

=
* multiply by
common denom +
cancel all denom.

$$\frac{4}{x+1} = \frac{2}{x-3} + 5$$

$$4(x-3) = 2(x+1) + 5(x-3)(x+1)$$

$$4x-12 = 2x+2 + 5(x^2-2x-3)$$

$$4x-12 = 2x+2 + 5x^2-10x-15$$

$$0 = 5x^2 - 12x - 1$$

factor or quadratic formula

Rat. Func $\geq, \leq$

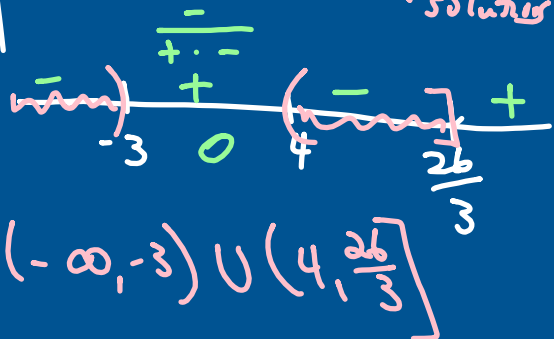
- 1) Set < 0 or > 0
- 2) Make common denom.
- 3) Test points

$$\frac{5}{x+3} \leq \frac{2}{x-4}$$

$$\frac{5(x-4)}{(x+3)(x-4)} - \frac{2(x+3)}{x-4(x+3)} \leq 0$$

$$\frac{5x-20-2x-6}{(x+3)(x-4)} \leq 0$$

$$\frac{3x-26}{(x+3)(x-4)} \leq 0$$



PARTIAL FRACTIONS

$$\frac{\text{~~~~~}}{(x+5)(x^2+6)} = \frac{A}{x+5} + \frac{Bx+C}{x^2+6}$$

$$\frac{\text{~~~~~}}{x^3(x+4)^2} = \frac{A}{(x+4)^2} + \frac{B}{x+4} + \frac{C}{\frac{x^3}{(x)^3}} + \frac{D}{x^2} + \frac{E}{x}$$

16(c)

$$\frac{6x^2 - 11x - 8}{x^3 - x^2 - 2x} =$$

$$x(x^2 - x - 2)$$

$$x(x-2)(x+1)$$

$$\begin{matrix} x \\ (x-2) \\ (x+1) \end{matrix} \left[\frac{6x^2 - 11x - 8}{x(x-2)(x+1)} = \frac{\overset{x(x-2)(x+1)}{A}}{\cancel{x}} + \frac{\overset{x(x-2)(x+1)}{B}}{\cancel{x-2}} + \frac{\overset{x(x-2)(x+1)}{C}}{\cancel{x+1}} \right]$$

$$6x^2 - 11x - 8 = A \overset{x^2 - x - 2}{(x-2)(x+1)} + Bx(x+1) + Cx(x-2)$$

$$\underline{6x^2} - \underline{11x} - \underline{8} = \underline{Ax^2} - \underline{Ax} - \underline{2A} + \underline{Bx^2} + \underline{Bx} + \underline{Cx^2} - \underline{2Cx}$$

$$6 = A + B + C$$

$$-11 = -A + B - 2C$$

$$-8 = -2A$$

$$\begin{bmatrix} 1 & 1 & 1 \\ -1 & 1 & -2 \\ -2 & 0 & 0 \end{bmatrix}^{-1} \cdot \begin{bmatrix} 6 \\ -11 \\ -8 \end{bmatrix}$$

$$\frac{4}{x} - \frac{1}{x-2} + \frac{3}{x+1} = \begin{bmatrix} 4 \\ -1 \\ 3 \end{bmatrix} \begin{matrix} A \\ B \\ C \end{matrix}$$

Like 17
Pull out common factors

Simplify.

$$\frac{4(2x-5)^3(3x^2+1)^{-2/3} - 6(2x-5)^2(3x^2+1)^{1/3+2/3}}{(3x^2+1)^{1/3}}$$

$$= \frac{2(2x-5)^2 \cdot \cancel{(3x^2+1)^{-2/3}} \cdot [2(2x-5) - 3(3x^2+1)^1]}{(3x^2+1)^{1/3+2/3}}$$

$$= \frac{2(2x-5)^2 [4x-10-9x^2-3]}{3x^2+1}$$

$$= \frac{2(2x-5)^2 [-9x^2+4x-13]}{3x^2+1}$$

$$\ln e^7 = 7$$

$$e^{3 \ln 5} = e^{\ln 5^3} = 125$$

$$\log_3 9 = \log_3 3^2 = 2$$

$$\log_8 \sqrt[3]{64} = \log_8 \sqrt[3]{8^2} = \log_8 8^{\frac{2}{3}} = \frac{2}{3}$$

$$\log_9 \frac{1}{81} = \log_9 \frac{1}{9^2} = \log_9 9^{-2} = -2$$

Log Problems

1) Make common bases

2) Exponentiate

3) Log + Plog

Properties of Logs

$$\log_b m + \log_b n = \log_b (mn)$$

$$\log_b m - \log_b n = \log_b \left(\frac{m}{n}\right)$$

$$\log_b m^p = p \log_b m$$

$$\log_{\frac{1}{3}} \sqrt[5]{27} = x$$

$$\ln 2 + \ln(3x+7) = 4$$

$$e^{\ln(6x+14)} = e^4$$

$$6x+14 = e^4$$

$$\frac{6x}{6} = \frac{e^4 - 14}{6}$$

Check for 1 + values.

$$\log_2 (x+3) - \log_2 (2x) = 3$$

$$\log_2 \left(\frac{x+3}{2x}\right) = 3$$

$$\frac{x+3}{2x} = 8 \cdot 2x$$

$$x+3 = 16x$$

$$3 = 15x$$

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

Like h

$$e^{2x} - 3e^x - 10 = 0$$

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