

Distinct Quadratic Factors

1)

$$\frac{2x - 1}{x(x^2 + 4)}$$

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

2)

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

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

3)

$$\frac{x^2 + 8}{x^4 - 2x^2 - 8}$$

$$\frac{\frac{1}{2}}{x - 2} + \frac{-\frac{1}{2}}{x + 2} + \frac{-1}{x^2 + 2}$$

4)

$$\frac{6x^2 + 3x - 20}{x^3 - 5x}$$

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

Distinct Quadratic Partial Fractions HW

#1
$$\frac{A}{x} + \frac{Bx+C}{x^2+4} = \frac{2x-1}{x(x^2+4)}$$

Use Parentheses!
(Bx+C)

$$A(x^2+4) + (Bx+C)(x) = 2x-1$$

"x=0"

$$A(4) + 0 = 2(0) - 1$$

$$4A = -1$$

$$A = -1/4$$

$$-1/4(x^2+4) + Bx^2 + Cx = 2x-1$$

$$-1/4x^2 - 1 + Bx^2 + Cx = 2x-1$$

$$Bx^2 + Cx = 1/4x^2 + 2x$$

$$B = 1/4 \quad C = 2$$

$$\frac{-1/4}{x} + \frac{1/4x+2}{x^2+4}$$

#2
$$\frac{4x^2+2x-1}{x^2(x+1)} = \frac{Ax+B}{x^2} + \frac{C}{x+1}$$

Use parentheses!
→

$$(Ax+B)(x+1) + C(x^2) = 4x^2+2x-1$$

"x=-1"

$$0 + C(1) = 4 + 2(-1) - 1$$

$$C = 1$$

"x=0"

$$(B)(1) + C(0) = 0 + 0 - 1$$

$$B = -1$$

$$(Ax-1)(x+1) + 1(x^2) = 4x^2+2x-1$$

$$Ax^2 + Ax - x - 1 + x^2 = 4x^2+2x-1$$

$$Ax^2 + Ax = 3x^2 + 3x$$

$$A = 3$$

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

Distinct Quadratic HW (continued)

$$3. \quad \frac{x^2+8}{(x^2+2)(x^2-4)} = \frac{A}{x-2} + \frac{B}{x+2} + \frac{Cx+D}{x^2+2}$$

"x=2"

$$A(x+2)(x^2+2) + B(x-2)(x^2+2) + (Cx+D)(x-2)(x+2) = x^2+8$$

$$A(4)(6) + B(0) + (Cx+D)(0) = 4+8$$

$$24A = 12$$

$$A = 1/2$$

"x=-2"

$$A(0) + B(-4)(6) + (Cx+D)(0) = 12$$

$$-24B = 12$$

$$B = -1/2$$

$$1/2(x^3+2x^2+2x+4) + (-1/2)(x^3-2x^2+2x-4) + (Cx+D)(x^2-4) = x^2+8$$

$$\cancel{1/2}x^3 + x^2 + x + 2 - \cancel{1/2}x^3 + x^2 - x + 2 + Cx^3 + Dx^2 - 4Cx - 4D = x^2+8$$

$$2x^2+4 + Cx^3 + Dx^2 - 4Cx - 4D = x^2+8$$

$$\underline{Cx^3 + Dx^2 - 4Cx - 4D} = \underline{-x^2 + 4}$$

$$C = 0$$

$$D = -1$$

$$\boxed{\frac{1}{2} \frac{1}{x-2} + \frac{-1}{2} \frac{1}{x+2} + \frac{-1}{x^2+8}}$$

$$\#4 \quad \frac{6x^2+3x-20}{x(x^2-5)} = \frac{A}{x} + \frac{Bx+C}{x^2-5}$$

$$A(x^2-5) + (Bx+C)(x) = 6x^2+3x-20$$

"x=0"
 $A(-5) + (0) = -20$

$$-5A = -20$$

$$\boxed{A=4}$$

$$4(x^2-5) + Bx^2+Cx = 6x^2+3x-20$$

$$4x^2-20 + Bx^2+Cx = 6x^2+3x-20$$

$$Bx^2+Cx = 2x^2+3x$$

$$B=2 \quad C=3$$

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

