

9/3/ Precal

Qmiz 2

avg 88

B1 (1)

$$p = 2x - 6$$

$$q = 1x - 1$$

a) $p + q = 3x - 7$

b) $(2x - 6)(x - 1)$

$$\begin{array}{ccccccc} 2x^2 & - & 2x & - & 6x & + & 6 \\ F & & 0 & & 1 & & L \end{array} = \textcircled{2x^2 - 8x + 6}$$

$$2(x^2 - 4x + 3)$$

$$2(x - 1)(x - 3)$$

(2)

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

$$q = x + 2$$

(a) $(x^3 - 2x^2 + \underline{\underline{3x}} - \underline{\underline{6}}) - (\underline{\underline{x}} + 2)$

$$x^3 - 2x^2 + 2x - 8$$

(b)

$$\underline{(x^3 - 2x^2 + 3x - 6)} \underline{(x + 2)}$$

$$\begin{aligned} & x^4 - \cancel{2x^3} + 3x^2 + \cancel{6x} \\ & + \cancel{2x^3} - 4x^2 + \cancel{6x} - 12 \end{aligned}$$

$$= x^4 - x^2 - 12$$

could factor

$$(x-2)$$

$$(x^2 + 3)(x-2)(x+2)$$

$$y = x^2$$

$$y^2 - y - 12$$

$$(y+3)(y-4)$$

$$(x^2+3)(x^2-4)$$

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

-1	12
1	-12
3	-4
-3	4
2	6
-2	6

same

Last time Factoring Polynomials

Grouping

observe common factor

Diff of squares

$$u^2 - v^2$$

Diff of cubes

$$u^3 - v^3$$

"by inspection"

$$x^2 - 29x + 100$$

$$(x-4)(x-25)$$

$$\begin{array}{r} 1 \quad 100 \\ - \quad -100 \\ \hline 4 \quad 25 \\ 20 \quad 5 \\ 10 \quad 10 \\ 2 \quad 50 \end{array}$$

Rational Expressions

$$R(x) = \frac{p(x)}{q(x)} \leftarrow q \neq 0$$

$$\text{Domain} = \{x : p(x) \text{ defined}\}$$

Simplifying can cancel

Ex1

$$R(x) = \frac{x-1}{x^2-1}$$

dom
 $x; x \neq \pm 1$

$$(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$$

$$R(x) = \frac{x-1}{x^2-1}, x \neq \pm 1$$

~~$x-1$~~

~~$(x-1)(x+1)$~~

$$\frac{1}{x+1}$$

$$x \neq -1, 1$$

Ex2

$$R(x) =$$

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

$$\frac{(3x+2)(x-1)}{-(x+5)(x-1)}$$

$$(3x+A)(x+B)$$

1

$$3B + A = -1$$

$$AB = -2$$

$$A = 2$$

$$B = -1$$

works

$$\frac{-(3x+2)}{x+5}, \quad x \neq 1$$

Operations

$+ / -$	$\cdot / \div$
harder	EASY

Ex 3 (a) MULT

$$\frac{3x^2 - x - 2}{5 - 4x - x^2} \cdot \frac{x^2 - 25}{x+1} =$$

$$\frac{(3x^2 - x - 2) \cdot (x^2 - 25)}{(5 - 4x - x^2) \cdot (x+1)} =$$

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

$$-\frac{(3x+2)(x-5)}{(x+1)}$$

$$x \neq 1, -5$$

$$= -\frac{3x^2 - 13x - 10}{x+1}$$

$$x \neq 1, -5$$

(b)

DIVISION

$$\frac{x^4 - 16}{x+1} \div \frac{x^2 - 4}{x^2} =$$

$$\cancel{(x^2-4)}(x^2+4) \div \frac{x^4 - 16}{x+1} \cdot \frac{x^2}{\cancel{x^2-4}} =$$

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

$$x \neq \pm 2$$

$$\frac{6x^4}{x+1}$$

addition

(a)

$$\frac{2}{x-1} + \frac{5}{x-10}$$

Need
Common
Denominators

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

$$\frac{2x-20 + 5x-5}{(x-1)(x-10)} =$$

$$\frac{7x-25}{(x-1)(x-10)} = \frac{7x-25}{x^2-11x+10}$$

(b) $\frac{3}{x-1} + \frac{17}{x+1} - \frac{(x^2+3)}{x^2-1}$

Common denominator:

could use

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

BETTER:

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

$$\frac{3(x+1) + 17(x-1) + (x^2+3)}{(x-1)(x+1) = x^2-1}$$

$$\frac{3x+3+17x-17+x^2+3}{x^2-1}$$

$$\frac{x^2+20x-11}{x^2-1}$$

(b)

$$\frac{2-x}{x^2-9} = \frac{x}{\boxed{x^2+4x+3}}$$

$$\frac{2-x}{(x-3)(x+3)} = \frac{x}{(x+1)(x+3)}$$

could use

$$(x^2-9)(x^2+4x+3)$$

But better

$$(x-3)(x+3)(x+1)$$

$$\frac{(2-x)(x+1) - x(x-3)}{(x-3)(x+3)(x+1)} =$$

$$\frac{-x^2 + x + 2 - x^2 + 3x}{(x^2-9)(x+1)} =$$

$$\frac{-2x^2 + 4x + 2}{x^3 + x^2 - 9x - 9}$$

Calculus examples:

$$(a) \quad \frac{-x^3(1-x^2)^{-1/2} - 2x(1-x^2)^{1/2}}{x^4}$$

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

$$\frac{-x^3 - 2x(-x^2)'}{\sqrt{1-x^2} \cdot x^4} =$$

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

$$x^3 - 2x$$

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

$$(b) \quad \frac{\frac{1}{3}(x-2)(x+1)^{-2/3} - (x+1)^{1/3}}{(x-2)^2} =$$

multi by

$$\frac{3(x+1)^{2/3}}{3(x+1)^{2/3}}$$

to get

$$\frac{x+1}{x+1}$$

$$\frac{(x-2) - 3 \sqrt[3]{(x+1)^2 (x+1)^3}}{3 (x+1)^{2/3} (x-2)^2}$$

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

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

f(x) 5

$$\frac{\frac{x^2}{(x+1)^2}}{\frac{x}{(x+1)^3}} =$$

$$\frac{x^2}{(x+1)^2} \cdot \frac{(x+1)^3}{x} = x(x+1)$$

$x \neq 0, -1$