

## Review of chapter R

2-2-2018 class notes

SOME MORE PRACTICE PROBLEMS

**ANSWERS AT THE BOTTOM**

0. Simplify  $\frac{\frac{1}{x+1}}{\frac{-5}{x^2-3x-4} + \frac{1}{x-4}}$

Answers in notes from 1-31 (also enclosed below).

1. Simplify as much as you can:  $\frac{45 + 9x - 5x^2 - x^3}{x^3 - 3x^2 - 25x + 75}$

2. Factor  $x^2 - 2\sqrt{5}x + 5$ .

3. Factor  $12x^2 - 14x - 40$ .

**ANSWERS BELOW**

4. Which of following are polynomials? If yes, say what the degree and leading coefficient is.

a.  $\frac{4}{x^2 + 6x + 5}$

b.  $\sqrt{x} - 11x + x^2$

c.  $2x^{2.1} + 3x^2 + x - 1$ .

d.  $\pi x + \sqrt{2} + x^2$ .

5. Divide and simplify:  $\frac{y^3 - 27}{9 - y^2}$  by  $\frac{5y^2 + 15y + 45}{y^2 + 8y + 15}$

# ANSWERS BELOW

## Review of chapter R

2-2-2018 class notes

### SOME MORE PRACTICE PROBLEMS

0. Simplify  $\frac{\frac{1}{x+1}}{-5} + \frac{1}{x^2-3x-4} + \frac{1}{x-4}$

Answers in notes from 1-31 (also enclosed below).

1. Simplify as much as you can:  $\frac{45+9x-5x^2-x^3}{x^3-3x^2-25x+75} = \frac{9(5+x)-x^2(5+x)}{x^2(x-3)-25(x-3)}$

$$= \frac{(5+x)(9-x^2)}{(x-3)(x^2-25)} = \frac{(5+x)(3-x)(3+x)}{-1(x-3)(x-5)(x+5)} = \frac{3+x}{5-x}$$

2. Factor  $x^2 - 2\sqrt{5}x + 5$ .

Use  $A^2 - 2AB + B^2 = (A-B)^2$   $A=x$   $B=\sqrt{5}$  So  $x^2 - 2\sqrt{5}x + 5 = (x-\sqrt{5})^2$

3. Factor  $12x^2 - 14x - 40$ .

$$= 2(6x^2 - 7x - 20) = 2(6x^2 - 15x + 8x - 20) = 2(3x(2x-5) + 4(2x-5)) = 2(3x+4)(2x-5) \text{ - CHECK!}$$

$6x-20 = -120$   
Find  $m \times n = -120$ ,  $m+n = -7$

4. Which of following are polynomials? If yes, say what the degree and leading coefficient is.

a.  $\frac{4}{x^2+6x+5}$  NO (Polynomial:  $a_n x^n + a_{n-1} x^{n-1} + \dots + a_0$ )

b.  $\sqrt{x} - 11x + x^2$  NO ( $\sqrt{x} = x^{1/2}$ ;  $1/2$  is not natural number)

c.  $2x^{2.1} + 3x^2 + x - 1$  NO (Same reason:  $2.1$  NOT IN  $\mathbb{N}$ )

d.  $\pi x + \sqrt{2} + x^2$  Yes, deg = 2, leading = 1 (coefficients in  $\mathbb{R}$ )  
 $= x^2 + \pi x + \sqrt{2}$

5. Divide and simplify:  $\frac{y^3-27}{9-y^2}$  by  $\frac{5y^2+15y+45}{y^2+8y+15}$   $= \frac{(y-3)(y^2+3y+9)}{-1(3-y)(3+y)} \times \frac{y^2+8y+15}{5y^2+15y+45}$

Use  $A^3 - B^3 = (A-B)(A^2 + AB + B^2)$

$y^3 - 3^3 = (y-3)(y^2 + 3y + 9)$

$9 - y^2 = (3-y)(3+y)$

$$= \frac{(y^2+3y+9)}{-1(3+y)} \times \frac{(y+5)(y+3)}{5(y^2+3y+9)} = \frac{-(y+5)}{5}$$

SOME PRACTICE PROBLEMS

Simplify the following, as much as you can.

$$1. \frac{x^2 - 9}{x^2 - 4x - 21} = \frac{(x+3)(x-3)}{x^2 - 7x + 3x - 21} = \frac{(x+3)(x-3)}{(x-7)(x+3)} = \frac{x-3}{x-7}$$

cancel like this because it is multiplication

$$2. \frac{15tu^5v}{3tu^2} = 5u^{5-2}v = 5u^3v$$

$$3. \frac{8x-3y}{x^3y^4} \times \frac{6xy^8}{24x-9y} = \frac{\cancel{8x-3y} \times \cancel{2} \cancel{6} \cancel{x} \cancel{y} \cancel{8}}{x^3y^4 \cancel{3}(\cancel{8x-3y})} = \frac{2y^{8-4}}{x^3-1}$$

$$= 2y^4/x^2$$

$$4. \frac{4}{x^2+6x+5} - \frac{3}{x^2+7x+10} = \frac{4}{(x+5)(x+1)} - \frac{3}{(x+5)(x+2)}$$

LCM of denominators  $(x+5)(x+1)(x+2)$

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

$$5. \frac{8}{\sqrt{15}-\sqrt{11}} = \frac{8(\sqrt{15}+\sqrt{11})}{(\sqrt{15}-\sqrt{11})(\sqrt{15}+\sqrt{11})} = \frac{8(\sqrt{15}+\sqrt{11})}{15-11} = \frac{8(\sqrt{15}+\sqrt{11})}{4} = 2(\sqrt{15}+\sqrt{11})$$

$$6. \frac{\frac{1}{x+1}}{\frac{-5}{x^2-3x-4} + \frac{1}{x-4}} = \frac{1}{x+1} \div \frac{-5 + 1(x+1)}{(x-4)(x+1)} = \frac{1}{x+1} \times \frac{x+1}{-5 + 1(x+1)} = \frac{1}{x+1} \times \frac{x+1}{-5 + x + 1} = \frac{1}{x+1} \times \frac{x+1}{x-4} = \frac{1}{x-4}$$