Alg II Unit 4A 01/29/2016

Unit 3 Test Review

Test Review Form A, Rational + Radical Relationships

3) $\left(\frac{6x-18}{x^2-4}\right)\left(\frac{x^2+5x+6}{x^2-9}\right)$

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

$= \frac{6}{x-2}$

4) $\frac{1}{1-x} + \frac{x}{x-1}$

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

$\frac{1}{-1(x-1)} + \left(\frac{x}{x-1}\right)\left(\frac{-1}{-1}\right)$

$\frac{1+(-x)}{-1(x-1)}$

excl value

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

$x=1$

$= 1$

Alg II Unit 4a Test Review 01/28/2016

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

$\left(\frac{2}{x+1} + \frac{4}{(x+1)(x-1)} = 1\right)(x+1)(x-1)$

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

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

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

$(x+1)(x-3) = 0$

$x = -1$ extraneous $\quad \boxed{x=3}$

$x = -1$

L.H.S. $= \frac{2}{(-1)+1} + \frac{4}{(-1)^2-1}$

$\frac{2}{0} + \frac{4}{0}$

undefined

R.H.S. $= 1$

12) $\left(\frac{x^2-16}{x^2-6x+8}\right)\left(\frac{5x-10}{3x+12}\right)$

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

$= \frac{5}{3}$

$x = 3$

L.H.S. $= \frac{2}{(3)+1} + \frac{4}{(3)^2-1}$

$= \frac{2}{4} + \frac{4}{8}$

$= \frac{1}{2} + \frac{1}{2}$

$= 1$ ✓

R.H.S. $= 1$

Alg II Unit 4a Review 01/28/2016

13) $\frac{2}{x+3} + \frac{3}{x^2+7x+12}$

$= \left(\frac{x+4}{x+4}\right)\left(\frac{2}{x+3}\right) + \frac{3}{(x+4)(x+3)}$

excluded value

$(x+3)(x+4) = 0$

$x = -3 \quad x = -4$

$= \frac{(2x+8)+3}{(x+3)(x+4)}$

$= \frac{2x+11}{(x+3)(x+4)}$, undefined @ $x = -3$ + $x = -4$

$\therefore x \neq -3 + x \neq -4$

16) $\frac{3}{x+1} + \frac{10}{x^2+2x+1} = 1$

$\left(\frac{3}{x+1} + \frac{10}{(x+1)(x+1)} = 1\right)(x+1)(x+1)$

$(3x+3) + 10 = x^2 + 2x + 1$

$x^2 - x - 12 = 0$

$(x+3)(x-4) = 0$

$x = -3, \; x = 4$

$x = -3$

L.H.S. $= \frac{3}{(-3)+1} + \frac{10}{(-3)^2+2(-3)+1}$

$= \frac{3}{-2} + \frac{10}{4}$

$= \frac{5}{2} - \frac{3}{2}$

$= \frac{2}{2} = 1$

R.H.S. $= 1$ ✓

$x = 4$

L.H.S. $= \frac{3}{(4)+1} + \frac{10}{(4)^2+2(4)+1}$

$= \frac{3}{5} + \frac{10}{25}$

$= \frac{3}{5} + \frac{2}{5}$

$= 5/5 = 1$

R.H.S. $= 1$ ✓

Alg II Unit 4A Review 1/28/2016

Test Form B, Rational + Radical Relationships

3) $\dfrac{x^2+3x-10}{x^2-2x-15} \div \dfrac{x^2+x-6}{x^2+6x+9}$

$= \left(\dfrac{x^2+3x-10}{x^2-2x-15}\right)\left(\dfrac{x^2+6x+9}{x^2+x-6}\right)$

$= \dfrac{(x+5)(x-2)(x+3)(x+3)}{(x+3)(x-5)(x+3)(x-2)}$

$= \dfrac{x+5}{x-5}$

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

$= \dfrac{1}{-x+1} + \dfrac{x}{(x+1)(x-1)}$

$= \left(\dfrac{x+1}{x+1}\right)\dfrac{1}{(-1)(x-1)} + \dfrac{x}{(x+1)(x-1)}\left(\dfrac{-1}{-1}\right)$

excluded value: $(-1)(x+1)(x-1) = 0$, $x = \pm 1$

$= \dfrac{(x+1) + -(x)}{-1(x+1)(x-1)}$

$= \dfrac{-1}{(x+1)(x-1)}$, undefined @ $x = \pm 1$, $x \neq \pm 1$

Alg II Unit 4A Review 01/28/2016

7) $\frac{2}{x} + \frac{4}{x+1} = 9$

$\left(\frac{2}{x} + \frac{4}{x+1} = 9\right)(x)(x+1)$

$\left(\frac{2}{x}\right)(x)(x+1) + \left(\frac{4}{x+1}\right)(x)(x+1) = 9x(x+1)$

$2x + 2 + 4x = 9x^2 + 9x$

$9x^2 + 3x - 2 = 0$ → Factor

P(-1)	D(3)
6	-3

$(9x^2 - 3x) + (6x - 2) = 0$

$3x(3x-1) + 2(3x-1) = 0$

$(3x-1)(3x+2) = 0$

$x = 1/3 \quad x = -2/3$

Check: $x = \frac{1}{3}$

L.H.S.	R.H.S.
$= \frac{2}{(1/3)} + \frac{4}{(1/3)+1}$	$= 9$
$= 6 + 3$	
$= 9$ ✓	

Check: $x = -2/3$

L.H.S.	R.H.S.
$= \frac{2}{(-2/3)} + \frac{4}{(-2/3)+1}$	$= 9$
$= -3 + 12$	
$= 9$ ✓	

Alg II Unit 4A Review 01/28/2016

12) $\dfrac{x^2-9x-36}{x^2-3x-18} \div \dfrac{2x^2-21x-36}{2x^2+15x+18}$

$= \left(\dfrac{x^2-9x-36}{x^2-3x-18}\right)\left(\dfrac{2x^2+15x+18}{2x^2-21x-36}\right)$

$= \dfrac{(x+3)(x-12)(2x+3)(x+6)}{(x+3)(x-6)(2x-3)(x-12)}$

$= \dfrac{x+6}{x-6}$

P(36) | S(15) | 12 + 3

$(2x^2+3x)+(12x+18)$
$= x(2x+3)+6(2x+3)$
$= (2x+3)(x+6)$

P(-72) | D(-21) | -24 + 3

$= (2x^2-24x)+(3x-36)$
$= 2x(x-12)+3(x-12)$
$(x-12)(2x-3)$

13) $\dfrac{1}{2-x} + \dfrac{x+1}{x^2-4}$

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

$\left(\dfrac{x+2}{x+2}\right)\left(\dfrac{-1}{x-2}\right) + \dfrac{x+1}{(x+2)(x-2)}$

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

$= \dfrac{-1}{(x+2)(x-2)}$, undefined @ $x = \pm 2$

excluded value: $x \neq \pm 2$

$(x+2)(x-2) = 0$
$x = \pm 2$

16) $\dfrac{2}{x} + \dfrac{6}{x+1} = 15$

$\left(\dfrac{2}{x} + \dfrac{6}{x+1} = 15\right)(x)(x+1)$

$\left(\dfrac{2}{x}\right)(x)(x+1) + \left(\dfrac{6}{x+1}\right)(x)(x+1) = 15x(x+1)$

$(2x+2) + 6x = 15x^2 + 15x$

P(-30) | D(7) | 10 - 3

$15x^2 + 7x - 2 = 0$
$(15x^2-3x)+(10x-2) = 0$
$3x(5x-1)+2(5x-1) = 0$
$(5x-1)(3x+2) = 0$
$x = 1/5, \quad x = -2/3$

Alg II Unit 4A Test Review 01/24/2019

16) Cont'

Check: $x = \frac{1}{5}$

L.H.S.	R.H.S.
$\frac{2}{(\frac{1}{5})} + \frac{6}{(\frac{1}{5})+1}$	$= 15$
$= 10 + 5$ ✓	
$= 15$	

Check: $x = \frac{-2}{3}$

L.H.S.	R.H.S.
$\frac{2}{(\frac{-2}{3})} + \frac{6}{(\frac{-2}{3})+1}$	$= 15$
$-3 + 18$ ✓	
$= 15$	

Alg II Unit 4A Review

Test Form C, Rational + Radical Relationships

omit 3) $\left(\frac{1-x^2}{x^2+x+1}\right) \div \frac{x^2-2x+1}{x^3-1}$

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

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

$= -(x+1)$

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

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

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

excl. value

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

$x = -1 \quad x = 1$

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

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

Alg II Unit 4A Review 01/28/2016

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

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

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

$2(x^2-2x+1) + 8(x+1) = 5x^2 - 5$

$2x^2 - 4x + 2 + 8x + 8 = 5x^2 - 5$

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

$-2x^2 \qquad\qquad -2x^2$

$4x + 10 = 3x^2 - 5$

$3x^2 - 4x - 15 = 0$

$(3x^2 + 5x) + (-9x - 15) = 0$

$x(3x+5) - 3(3x+5) = 0$

$(3x+5)(x-3) = 0$

$x = -5/3 \qquad x = 3$

P(-45) | D(-4)
5 -9

Check: $x = -5/3$

L.H.S.	R.H.S.
$= \frac{(-\frac{5}{3})-1}{(-\frac{5}{3})+1} + \frac{4}{(-\frac{5}{3})-1}$	$= \frac{5}{2}$
$= 4 + (-\frac{3}{2})$	
$= 5/2$	

Check: $x = 3$

L.H.S.	R.H.S.
$= \frac{(3)-1}{(3)+1} + \frac{4}{(3)-1}$	$= \frac{5}{2}$
$= 1/2 + 2$	
$= 5/2$	

Alg II Unit 4A Review 01/28/2016

13) $\frac{1}{1-x} - \frac{1}{1+x}$

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

excl. value

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

$x = -1 \quad x = 1$

$= \left(\frac{x+1}{x+1}\right)\frac{-1}{(x-1)} - \frac{1}{(x+1)}\left(\frac{x-1}{x-1}\right)$

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

16) $\frac{3}{2x} + \frac{1}{3x-4} = \frac{2}{8-x}$

$\left(\frac{3}{2x} + \frac{1}{3x-4} = \frac{2}{-1(x-8)}\right)(2x)(3x-4)(x-8)$

$\frac{3(2x)(3x-4)(x-8)}{2x} + \frac{1(2x)(3x-4)(x-8)}{(3x-4)} = \frac{(-2)(2x)(3x-4)(x-8)}{x-8}$

$3(3x^2-24x-4x+32) + (2x^2-16x) = -4x(3x-4)$

$(9x^2-84x+96) + (2x^2-16x) = -12x+16x$

$11x^2-97x+96 = -12x^2+16x$

$23x^2-116x+96 = 0$

P(2208) | S(-116)

-24 + -92

$(23x^2-24x)+(-92+96) = 0$

$x(23x-24)-4(23-24) = 0$

$(23x-24)(x-4) = 0$

$x = \frac{24}{23} \quad x = 4$

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Als II Unit 4a 01/25/2019

16) Cont'

check: $x = \frac{24}{23}$

L.H.S.	R.H.S.
$= \frac{3}{2(\frac{24}{23})} + \frac{1}{3(\frac{24}{23})-4}$	$= \frac{2}{8-(\frac{24}{23})}$
$= \frac{23}{16} + \left(\frac{-23}{20}\right)$	$= \frac{23}{80}$
$= \frac{23}{80}$	✓

check: $x = 4$

L.H.S.	R.H.S.
$= \frac{3}{2(4)} + \frac{1}{3(4)-4}$	$= \frac{2}{8-(4)}$
$= \frac{3}{8} + \frac{1}{8}$	$= \frac{2}{4}$
$= 1/2$ ✓	$= 1/2$