Exam 1 Version A

MAT 1275/1544 Fall 2013
Professor Bonanome

NAME: Solutions

1. Evaluate: [2 points each]

(a) $\left(\frac{2^{-2}}{3^{-2}}\right)^3$ $= \left(\frac{3^2}{2^2}\right)^3 = \frac{3^6}{2^6} = \boxed{\frac{729}{64}}$ (2pts)

(b) $2^{-2} + 3^{-1}$ $= \frac{1}{2^2} + \frac{1}{3} = \frac{1}{4} + \frac{1}{3} = \frac{3}{12} + \frac{4}{12} = \boxed{\frac{7}{12}}$ (2pts)

2. Simplify. Express your solutions using positive exponents only. [6 points each]

(a) $(x^{-2}y^2z)(2x^{-3}y^{-1}z^{-1})$

$2x^{-2}x^{-3}y^{2}y^{-1}z^{1}z^{-1}$

$= 2x^{-5}y = \boxed{\frac{2y}{x^5}}$ (6pts)

(b) $\left(\frac{-72x^2y^{-4}}{6x^3y^{-7}}\right)^{-2}$ $= \left(\frac{-12y^3}{x}\right)^{-2}$

$= \left(\frac{x}{-12y^3}\right)^2 = \frac{x^2}{(-12)^2y^6} = \boxed{\frac{x^2}{144y^6}}$ (6pts)

6pts

(c) $\dfrac{8xy^5}{5x^3y^2} \div \dfrac{16xy^3}{15y^2}$

$$\frac{\cancel{8}^{1}x\cancel{y^5}^{2}}{\cancel{5}_{1}x^3\cancel{y^2}} \times \frac{\cancel{15}^{3}\cancel{y^2}}{\cancel{16}_{2}\cancel{x}\cancel{y^3}} = \boxed{\frac{3y^2}{2x^3}}$$

3. Simplify. [6 points each]

(6pts)

(a) $\dfrac{\left(\dfrac{4}{a} + \dfrac{2}{b}\right)ab^2}{\left(\dfrac{1}{a} - \dfrac{6}{b^2}\right)ab^2} = \boxed{\dfrac{4b^2+2ab}{b^2-6a}}$ or $\boxed{\dfrac{2b(2b+a)}{b^2-6a}}$

(b) $\dfrac{\left(\dfrac{7}{k+1} - 1\right)K+1}{\left(\dfrac{4}{k+1} + 1\right)K+1} = \dfrac{7-(K+1)}{4+(K+1)} = \dfrac{7-K-1}{4+K+1}$

$$= \boxed{\frac{6-K}{5+K}}$$

(6pts)

(c) $\dfrac{4n+3}{9} - \dfrac{2n+1}{12}$ $\qquad$ LCD = 36 $\qquad$ (6 pts)

$$\frac{4(4n+3)}{36} - \frac{3(2n+1)}{36} = \frac{16n+12-6n-3}{36}$$

$$= \boxed{\frac{10n+9}{36}}$$

6 pts

(d) $\dfrac{3a}{a^2+3a-10} - \dfrac{2a}{a^2+a-6} = \dfrac{3a(a+3)}{(a-2)(a+3)(a+5)} - \dfrac{2a(a+5)}{(a-2)(a+3)(a+5)}$

Find LCD:

Factor:

1) $a^2+3a-10=(a-2)(a+5)$

$a^2+a-6=(a-2)(a+3)$

2) List: $(a-2),(a+3),(a+5)$

3) LCD: $(a-2)(a+3)(a+5)$

$$= \frac{3a^2+9a-2a^2-10a}{(a-2)(a+3)(a+5)}$$

$$\boxed{= \frac{a^2-a}{(a-2)(a+3)(a+5)} = \frac{a(a-1)}{(a-2)(a+3)(a+5)}}$$

4. Solve these equations. Be sure to check your solution(s). [10 points each]

LCD: $y(y-2)$

(a) $y(y-2)\dfrac{25}{y} - \dfrac{25}{y-2} = \dfrac{2}{y}y(y-2)$

$$25(y-2) - 25y = 2(y-2)$$

$$\cancel{25y}-50-\cancel{25y} = 2y-4$$

$$-50 = 2y-4$$
$$+4 \qquad\quad +4$$

$$2y = -46$$

$\boxed{y=-23}$ is a solution

Check

$$\frac{25}{-23} - \frac{25}{-23-2} \stackrel{?}{=} \frac{2}{-23}$$

$$\frac{-25}{-23} - \frac{25}{-25} = \frac{2}{-23}$$

$$-1\tfrac{2}{23}+1 \stackrel{\checkmark}{=} \frac{2}{-23}$$

$LCD = a(a-1)$

(10pts)

$$a(a-1)\left(\frac{1}{a-1}+1\right) = \left(\frac{1}{a^2-a}\right)a(a-1) \quad \text{(b)}$$

$a + a(a-1) = 1$

$\cancel{a} + a^2 - \cancel{a} = 1$

$a^2 = 1$

$\cancel{a = 1}$ reject

$\boxed{a = -1}$ Keep $a=-1$, it <u>is</u> a solution.

Check:

$a = -1$

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

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

(10pts)

$$3(x-4)(x+4)\left(\frac{x}{3x-12} + \frac{4}{x^2-16}\right) = \left(\frac{1}{3}\right)3(x+4)(x-4) \quad \text{(c)}$$

Find LCD:

1) Factor:
$3(x-4)$
$x^2-16 = (x+4)(x-4)$

2) List: $3, (x-4), (x+4)$

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

$x(x+4) + 4\cdot 3 = (x+4)(x-4)$

$\cancel{x^2} + 4x + 12 = \cancel{x^2} - 16$
$\quad -12 \qquad\qquad -12$

$4x = -28$

$\boxed{x = -7}$

Check:

$$\frac{-7}{3(-7)-12} + \frac{4}{(-7)^2-16} \stackrel{?}{=} \frac{1}{3}$$

$$\frac{-7}{-21-12} + \frac{4}{33} \stackrel{?}{=} \frac{1}{3}$$

$$\frac{7}{33} + \frac{4}{33} \stackrel{?}{=} \frac{1}{3}$$

$$\frac{11}{33} = \frac{1}{3}$$

5. Write in radical form then evaluate (if possible). [6 points each]

(a) $(c^2d)^{1/6}$

$\sqrt[6]{c^2d}$

(b) $64^{2/3}$

$\left(\sqrt[3]{64}\right)^2 = 4^2 = \boxed{16}$

(c) $\left(-\frac{8}{125}\right)^{2/3}$

$\left(\sqrt[3]{\left(-\frac{8}{125}\right)}\right)^2 = \left(-\frac{2}{5}\right)^2 = \boxed{\frac{4}{25}}$

(d) $-16^{-3/2}$

$-\frac{1}{16^{3/2}} = -\frac{1}{(\sqrt{16})^3} = \frac{-1}{4^3} = \boxed{\frac{-1}{64}}$