

Exam 1 Version B

MAT 1275 Fall 2013

NAME:

Solutions

1. Evaluate: [2 points each]

$$(a) \left(\frac{3^{-2}}{2^{-3}}\right)^2 = \frac{3^{-4}}{2^{-6}} = \frac{2^6}{3^4} = \boxed{\frac{64}{81}}$$

$$(b) 3^{-2} + 2^{-1} = \frac{1}{3^2} + \frac{1}{2} = \frac{1}{9} + \frac{1}{2} = \frac{2}{18} + \frac{9}{18}$$

$$= \boxed{\frac{11}{18}}$$

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

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

$$\frac{8xy^5}{5x^3y^2} \cdot \frac{15y^2}{16xy^3} = \boxed{\frac{3y^2}{2x^3}}$$

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

$$= 3x^{-3}x^{-2}yy^{-1}z^2z^{-2}$$

$$= 3x^{-5}y^0z^0 = \boxed{\frac{3}{x^5}}$$

$$(c) \left(\frac{-72x^{-2}y^4}{6x^{-3}y^{-4}} \right)^{-2} = (-12xy^8)^{-2} \quad (6 \text{ pts})$$

$$= \frac{1}{(-12)^2 x^2 y^{16}} = \boxed{\frac{1}{144x^2y^{16}}}$$

3. Simplify. [6 points each]

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

$$(b) \left(\frac{\frac{5}{x+1} - 1}{\frac{3}{x+1} + 1} \right) (x+1) = \frac{5 - (x+1)}{3 + (x+1)} = \frac{5 - x - 1}{3 + x + 1} = \boxed{\frac{4 - x}{4 + x}}$$

$$(c) \frac{8w^2}{w^3 - 16w} - \frac{4w}{w^2 - 4w}$$

6 pts

$$\begin{aligned} \text{LCD} &= w(w+4)(w-4) \\ &= \frac{8w^2}{w(w+4)(w-4)} - \frac{4w(w+4)}{w(w+4)(w-4)} \\ &= \frac{8w^2 - 4w^2 - 16w}{w(w+4)(w-4)} = \frac{4w^2 - 16w}{w(w+4)} \end{aligned}$$

$$\begin{aligned} &= \frac{4w(w-4)}{w(w+4)(w-4)} \\ &= \boxed{\frac{4}{w+4}} \end{aligned}$$

$$(d) \frac{4n+3}{9} - \frac{2n+1}{12}$$

$$\text{LCD} = 36$$

$$\begin{aligned} &\frac{4(4n+3)}{36} - \frac{3(2n+1)}{36} \\ &= \frac{16n+12-6n-3}{36} \\ &= \boxed{\frac{10n+9}{36}} \end{aligned}$$

6 pts

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

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

$$\text{LCD} = 3(a-4)(a+4)$$

Check:

$$\frac{-7}{-21-12} + \frac{4}{49-16} \stackrel{?}{=} \frac{1}{3}$$

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

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

$$\rightarrow a(a+4) + 4 \cdot 3 = (a+4)(a-4)$$

$$a^2 + 4a + 12 = a^2 - 16$$

$$4a = -28$$

$$\boxed{a = -7}$$

is the solution

$$(b) \frac{12}{y} - \frac{12}{y-5} = \frac{2}{y}$$

$$LCD = y(y-5)$$

$$\begin{aligned} \downarrow \\ 12(y-5) - 12y &= 2(y-5) \\ 12y - 60 - 12y &= 2y - 10 \\ +10 & \qquad \qquad +10 \end{aligned}$$

$$-50 = 2y$$

$$\boxed{y = -25} \text{ is the solution.}$$

check

$$\frac{12}{-25} - \frac{12}{-25-5} \stackrel{?}{=} \frac{2}{-25}$$

$$-.48 + .4 \stackrel{?}{=} -.08$$

$$-.08 = -.08$$

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

$$LCD: x(x-1)$$

$$\begin{aligned} \downarrow \\ x + x(x-1) &= 1 \\ \cancel{x} + x^2 - \cancel{x} &= 1 \end{aligned}$$

$$x^2 = 1$$

$x = \cancel{1}$ reject

$$\boxed{x = -1} \text{ is the solution}$$

check

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

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

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

$$(a) (st^2)^{1/6}$$

$${}^6\sqrt{st^2} \quad \text{or} \quad {}^6\sqrt{s} {}^3\sqrt{t}$$

(b) $27^{2/3}$

$$\left(\sqrt[3]{27}\right)^2 = 3^2 = \boxed{9}$$

(c) $-36^{-3/2}$

$$-\frac{1}{(\sqrt{36})^3} = -\frac{1}{6^3} = \boxed{-\frac{1}{216}}$$

(d) $\left(-\frac{64}{125}\right)^{1/3}$

$$= \frac{\sqrt[3]{-64}}{\sqrt[3]{125}} = \boxed{\frac{-4}{5}}$$