Pre-Calculus 11 **Chapter 6 – Rational Expressions and Equations**

Name: _____ Date: _____

1. Simplify and determine the NPV.

a) $\dfrac{-35a^2b^3c^4}{40abc^7}$ $= \dfrac{-7ab^2}{8c^3}$ $NPV: a \neq 0, b \neq 0, c \neq 0$	b) $\dfrac{12-3m}{20-5m}$ $= \dfrac{3}{5}$ $NPV: m \neq 4$
c) $\dfrac{6x^2-8x}{4x}$ $= \dfrac{3x-4}{2}$ $NPV: x \neq 0$	d) $\dfrac{m^2+2mn-3n^2}{3m^2+9mn}$ $= \dfrac{(m-n)}{3m}$ $NPV: m \neq 0, m \neq 3n$
e) $\dfrac{a^2+10ab+24b^2}{a^2-36b^2}$ $= \dfrac{(a+4b)}{(a-6b)}$ $NPV: a \neq \pm 6b$	f) $\dfrac{2x^3-28x^2-102x}{18x-2x^3}$ $= \dfrac{(x-17)}{-(x-3)}$ $NPV: x \neq 0, -3, 3$

2. Simplify and determine the NPV.

a) $\dfrac{(2m)^2}{5n} \times \dfrac{10m}{8n} \div \dfrac{15m}{(4n)^2}$ $= \dfrac{16m^2}{15}$ $NPV: m \neq 0, n \neq 0$	b) $\dfrac{2x^2-3x-20}{2x^2+5x-12} \times \dfrac{2x^2-15x+18}{2x^2-7x-30}$ $= \dfrac{(x-4)}{(x+4)}$ $NPV: x \neq -4, \dfrac{-5}{2}, \dfrac{3}{2}, 6$
c) $\dfrac{2x-1+\dfrac{3x}{x+1}}{3x-\dfrac{x}{x+1}}$ $= \dfrac{2x^2+4x-1}{x(3x+2)}$	d) $\dfrac{2y-5+\dfrac{3y^2-3y}{y+1}}{3y-1-\dfrac{2y+1}{y+1}}$ $= \dfrac{-5}{3y^2-2}$
e) $\dfrac{9a^2+42ab+49b^2}{2a^2-13ab+20b^2} \times \dfrac{4a^2-25b^2}{9a^2-49b^2} \div \dfrac{2a+5b}{3a^2-19ab+28b^2}$ $= 3a+7b$ $NPV: a \neq \pm\dfrac{5b}{2}, a \neq \pm\dfrac{7b}{3}, a \neq 4b$	

f) $\dfrac{2x^2+5xy+2y^2}{3x^2-8xy-3y^2}\times\dfrac{x^2-9y^2}{x^2-4y^2}\div\dfrac{3x^2+11xy+6y^2}{2x^2-3xy-2y^2}$

$=\dfrac{(x+2y)(2x+y)}{(x+3y)(3x+2y)}$ $NPV: x\neq\pm3y,\ x\neq\pm2y,\ x\neq-\dfrac{2y}{3},\ x\neq-\dfrac{y}{2},\ x\neq-\dfrac{y}{3}$

3. Simplify and state all NPVs.

a) $\dfrac{6x-11y}{9x}+\dfrac{3x-16y}{6y}$

$=\dfrac{9x^2-36xy-22y^2}{18xy}$

b) $\dfrac{2x+3y^2}{8xy}-3-\dfrac{5x^2-2y}{6x^2}$

$=\dfrac{6x^2-92x^2y+9xy^2+8y^2}{24x^2y}$

c) $\dfrac{7x}{x^2-x-12}-\dfrac{4x}{x^2+2x-3}$

$=\dfrac{3x}{(x-4)(x-1)}$

d) $\dfrac{3a+2}{a^2+10a+21}+\dfrac{5a-4}{15+2a-a^2}$

$=\dfrac{2(a^2+22a-9)}{(a+7)(a+3)(5-a)}$

e) $\dfrac{5m+25}{2m^2+13m+15}-\dfrac{2m-5}{m^2-4}$

$=\dfrac{m^2+4m-5}{(m+2)(m-2)(2m+3)}$

f) $\dfrac{3x+y}{2x^2-11xy-21y^2}+\dfrac{x-2y}{2x^2+11xy+12y^2}-\dfrac{2x+y}{x^2-3xy-28y^2}$

$=\dfrac{-x^2-4xy+15y^2}{(x-7y)(2x+3y)(x+4y)}$

4. Solve.

a) $\dfrac{x+15}{5}=\dfrac{2}{x}+\dfrac{x+1}{5}$

$x=\dfrac{5}{7}$

b) $\dfrac{2x+1}{3x-2}=\dfrac{4x+3}{6x-5}$

$x=\dfrac{1}{5}$

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

$x=\dfrac{-3}{2},3$

d) $\dfrac{9x^2}{x^2-25}=\dfrac{4x}{x-5}+\dfrac{x}{x+5}$

$x=0,\dfrac{15}{4}$

e) $x-\dfrac{1}{x+4}=-4$

$x=-5,-3$

f) $\dfrac{3x+2}{2x+1}=\dfrac{3x+1}{x-1}-\dfrac{1}{3}$

$x=-2,\dfrac{-5}{7}$

5. The average speed of an airplane is five times as fast as the average speed of a passenger train. To travel 2000km, the bus requires 20 hours more than the plane. Determine the average speeds of the train and the plane

$Train: 80\ {}^{km}/_{h}; \quad Plane: 400\ {}^{km}/_{h}$

6. The average speed of an express train is 40 km/h faster than the average speed of a bus. To travel 1200km, the bus requires 50% more time than the train. Determine the average speeds of the train and the bus.

$Bus: 80\ {}^{km}/_{h}; \quad Train: 120\ {}^{km}/_{h}$

7. Each week, Angela flies her small plane 500 km from Lethbridge to Moose Jaw. After a brief stopover, she returns to Lethbridge. On both trips, the air speed is 180 km/h. On the flight out there is a constant 20 km/h tail wind, and on the return trip a constant head wind of the same speed. Calculate the time needed for a round trip.

$time: 5\frac{5}{8}\ hours$