

Name: _____

Date: _____

1. Simplify and determine the NPV.

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

2. Simplify and determine the NPV.

a) $\frac{(2m)^2}{5n} \times \frac{10m}{8n} \div \frac{15m}{(4n)^2}$ $= \frac{16m^2}{15}$ NPV : $m \neq 0, n \neq 0$	b) $\frac{2x^2-3x-20}{2x^2+5x-12} \times \frac{2x^2-15x+18}{2x^2-7x-30}$ $= \frac{(x-4)}{(x+4)}$ NPV : $x \neq -4, \frac{-5}{2}, \frac{3}{2}, 6$
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$$\text{c) } \frac{2x-1+\frac{3x}{x+1}}{3x-\frac{x}{x+1}}$$

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

$$\text{d) } \frac{2y-5+\frac{3y^2-3y}{y+1}}{3y-1-\frac{2y+1}{y+1}}$$

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

$$\text{e) } \frac{9a^2+42ab+49b^2}{2a^2-13ab+20b^2} \times \frac{4a^2-25b^2}{9a^2-49b^2} \div \frac{2a+5b}{3a^2-19ab+28b^2}$$

$$= 3a+7b \quad \text{NPV: } a \neq \pm \frac{5b}{2}, a \neq \pm \frac{7b}{3}, a \neq 4b$$

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

$$= \frac{(x+2y)(2x+y)}{(x+3y)(3x+2y)} \quad \text{NPV: } x \neq \pm 3y, x \neq \pm 2y, x \neq -\frac{2y}{3}, x \neq -\frac{y}{2}, x \neq -\frac{y}{3}$$

3. Simplify and state all NPVs.

<p>a) $\frac{6x-11y}{9x} + \frac{3x-16y}{6y}$</p> $= \frac{9x^2 - 36xy - 22y^2}{18xy}$	<p>b) $\frac{2x+3y^2}{8xy} - 3 - \frac{5x^2-2y}{6x^2}$</p> $= \frac{6x^2 - 92x^2y + 9xy^2 + 8y^2}{24x^2y}$
<p>c) $\frac{7x}{x^2-x-12} - \frac{4x}{x^2+2x-3}$</p> $= \frac{3x}{(x-4)(x-1)}$	<p>d) $\frac{3a+2}{a^2+10a+21} + \frac{5a-4}{15+2a-a^2}$</p> $= \frac{2(a^2+22a-9)}{(a+7)(a+3)(5-a)}$
<p>e) $\frac{5m+25}{2m^2+13m+15} - \frac{2m-5}{m^2-4}$</p> $= \frac{m^2+4m-5}{(m+2)(m-2)(2m+3)}$	<p>f) $\frac{3x+y}{2x^2-11xy-21y^2} + \frac{x-2y}{2x^2+11xy+12y^2} - \frac{2x+y}{x^2-3xy-28y^2}$</p> $= \frac{-x^2-4xy+15y^2}{(x-7y)(2x+3y)(x+4y)}$

4. Solve.

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

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

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

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

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

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

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

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

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

$x = -5, -3$

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

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

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.

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

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.

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

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