Quiz: Rational Expressions **Name:** Sol^{n}

1. Fully factor the following:

$x \begin{matrix} -6 \\ +1 \end{matrix} \} -3, 2$

a) $x^2 - 2x - 24$

$= (x-6)(x+4)$

b) $2x^2 - x - 3$

$= 2x^2 - 3x + 2x - 3$

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

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

c) $3x^2 - 6x - 24$

$= 3(x^2 - 2x - 8)$

$= 3(x-4)(x+2)$

d) $4x^2 - 16$

$= 4(x^2 - 4)$

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

e) $x^2 - 5x + 7$

$=$ can't be factored

f) $2x^2y + 6x^2y - 8xy$

$= 2xy(x + 3x - 4)$

$= 2xy(4x - 4)$

$= 8xy(x-1)$

2. Simplify the following.

a) $\dfrac{-5x-15}{2x+6}$

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

$= -\dfrac{5}{2}$

b) $\dfrac{x^2-x-2}{x-1} \bullet \dfrac{x+3}{x+1}$

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

$= \dfrac{x^2+x-6}{x-1}$

c) $\dfrac{x}{x-2} + \dfrac{x+4}{x+5}$

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

$= \dfrac{x^2+5x+x^2+2x-8}{(x-2)(x+5)}$

$= \dfrac{2x^2+7x-8}{(x-2)(x+5)}$

3. Simplify the following and state any restrictions.

a) $\dfrac{5+5x}{x^2-2x-3}$

$= \dfrac{5(1+x)}{(x-3)(x+1)}$

$= \dfrac{5}{x-3}$, $x \neq 3, x \neq -1$

b) $\dfrac{x-3}{x+2} \div \dfrac{x^2-9}{x+1}$

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

$= \dfrac{x+1}{(x-3)(x+3)}$, $x \neq -2, x \neq -1$, $x \neq \pm 3$

c) $\dfrac{x}{x^2+5x+6} - \dfrac{3}{x^2-4}$

on next page

Bonus: Simplify → $\dfrac{1 - \dfrac{x}{x+1}}{\dfrac{5}{x} - \dfrac{2}{x+1}}$

on next page

$$\frac{x}{x^2+5x+6} - \frac{3}{x^2-4}$$

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

$$= \frac{x^2-2x-3x-9}{(x+2)(x+3)(x-2)}$$

$$= \frac{x^2-5x-9}{(x+2)(x+3)(x-2)}, \quad x \neq -2,\ x \neq -3,\ x \neq \pm 2$$

Bonus

$$\frac{1-\frac{x}{x+1}}{\frac{5}{x}-\frac{2}{x+1}}$$

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

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

$$= \frac{1}{x+1} \div \frac{3x+5}{x(x+1)}$$

$$\frac{1}{x+1} \times \frac{x(x+1)}{3x+5}$$

$$= \frac{x}{3x+5}, \quad x \neq -1,\ x \neq 0,\ x \neq -\frac{5}{3}$$