

Section 3.3 and 3.4 – Final Exam Prep

Answer the following four questions, show as many steps as you need to, write clearly and neatly.

1. Perform the indicated operations, state the Domain restrictions.

$$\frac{4}{x^2 - 4} + \frac{1}{2 - x} - \frac{1}{x + 2}$$

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

$$x \neq \pm 2$$

$$\frac{4}{(x+2)(x-2)} - \frac{(x+2)}{(x+2)(x-2)} - \frac{(x-2)}{(x+2)(x-2)}$$

$$\frac{4 - x - 2 - x + 2}{(x+2)(x-2)}$$

$$\frac{-2x + 4}{(x+2)(x-2)}$$

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

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

2. Perform the indicated operations, state the Domain restrictions.

$$\frac{2x + 8}{x^2 + 5x + 6} - \frac{x - 1}{x^2 + 3x + 2} - \frac{x + 5}{x^2 + 4x + 3}$$

$$\frac{2(x+4)}{(x+2)(x+3)} - \frac{x-1}{(x+2)(x+1)} - \frac{x+5}{(x+3)(x+1)}$$

$$x \neq -1, -2, -3$$

$$\frac{2(x+4)(x+1) - (x-1)(x+3) - (x+5)(x+2)}{(x+1)(x+2)(x+3)}$$

$$\frac{2(x^2 + 5x + 4) - (x^2 + 2x - 3) - (x^2 + 7x + 10)}{(x+1)(x+2)(x+3)}$$

$$\frac{2x^2 + 10x + 8 - x^2 - 2x + 3 - x^2 - 7x - 10}{(x+1)(x+2)(x+3)}$$

denom

$$\frac{\cancel{(x+1)}}{(x+1)(x+2)(x+3)}$$

$$\frac{1}{(x+2)(x+3)}$$

3. Simplify the combined operations. State the Domain Restrictions.

$$\left(\frac{1}{1} - \frac{4}{x^2}\right) \div \left(\frac{2}{x^2} - \frac{1}{x}\right)$$

$$\frac{x^2 - 4}{x^2} \div \frac{2 - x}{x^2}$$

$$\frac{x^2 - 4}{x^2} \cdot \frac{x^2}{2 - x}$$

$$\frac{(x-2)(x+2) \cdot \cancel{x^2}}{1 \cdot -1(x-2)} \Rightarrow \boxed{-1(x+2)}$$

Domain
Restrictions
Now
 $x \neq 0$
 $x \neq 2$

4. Simplify the Combined Operation, State the Domain Restrictions.

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

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

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

$$\boxed{x \neq -2, 2, -3}$$

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

$$= \boxed{-1}$$