

Simplify Completely.

$$1.) \frac{3x^2-48}{x^3-27} \div \frac{6x^3+36x^2+48x}{2x^3-2x^2-12x} \cdot \frac{2x^3+6x^2+18x}{x^3+4x^2-16x-64}$$

$$(x^3+4x^2) + (-16x-64)$$

$$x^2(x+4) - 16(x+4)$$

$$(x+4)(x^2-16)$$

$$(x+4)(x-4)(x+4)$$

$$\frac{3(x^2-16)}{x^3-27} \div \frac{6x(x^2+6x+8)}{2x(x^2-x-6)} \cdot \frac{2x(x^2+3x+9)}{x^3+4x^2-16x-64}$$

$$\frac{\cancel{3}(x-4)(x+4)}{\cancel{(x-3)}(x^2+3x+9)} \cdot \frac{\cancel{2x}(x-3)(x+2)}{\cancel{6x}(x+4)(x+2)} \cdot \frac{2x(x^2+3x+9)}{(x+4)\cancel{(x-4)}(x+4)}$$

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

Solve. Remember to check for extraneous answers.

$$2.) \frac{6}{x^2+6x+8} + \frac{(x-1)}{(x+2)} = \frac{5}{x+4}$$

$$\left[\frac{6}{(x+4)(x+2)} + \frac{x-1}{x+2} = \frac{5}{x+4} \right] (x+4)(x+2)$$

$$6 + (x-1)(x+4) = 5(x+2)$$

$$6 + x^2 + 3x - 4 = 5x + 10$$

$$x^2 - 2x - 8 = 0$$

$$(x-4)(x+2) = 0$$

$$\boxed{x=4} \quad x=-2$$

EXTRANEIOUS

3.) Write an equation of a rational equations that has the following information:

- A hole at $x = 2$
- A vertical asymptote at $x = -4$
- A horizontal asymptote at $y = 3$

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