

Simplify. SHOW ALL WORK! (3 pts each)

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

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

$$= \frac{x-5}{2x^3} ; \{x \neq -2, -1, 0\}$$

$$2) \frac{x^2 - 8x - 20}{15x^4 - 150x^3} \div \frac{x^2 - 9x}{x^2 - 7x - 18}$$

$$= \frac{(x-10)(x+2)}{15x^3(x-10)} \cdot \frac{(x-9)(x+2)}{x(x-9)}$$

$$= \frac{(x+2)^2}{15x^4} ; \{x \neq -2, 0, 9, 10\}$$

$$3) \frac{2x^2 - 2}{x^2 - 6x - 7} \cdot (x^2 - 10x + 21)$$

$$= \frac{2(x-1)(x+1)}{(x-7)(x+1)} \cdot \frac{(x-7)(x-3)}{1}$$

$$= 2(x-1)(x-3) ; \{x \neq -1, 3, 7\}$$

$$4) \frac{x-2}{x^2 + 7x - 18} \div \frac{x^3 - 6x^2 - 27x}{x^2 + 8x - 9}$$

$$= \frac{x-2}{(x+9)(x-2)} \cdot \frac{(x-9)(x-1)}{x(x-9)(x+3)}$$

$$= \frac{x-1}{x(x-9)(x+3)} ; \{x \neq -3, 0, 1, 2, \pm 9\}$$

$$5) \frac{x}{x^2 + 6x + 9} + \frac{3}{x^2 - 9}$$

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

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

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

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

$$= \frac{4(x+3) - 2(x-1)}{(x-1)(x+3)} = \frac{4x - 2x + 12 + 2}{(x-1)(x+3)}$$

$$= \frac{2x + 14}{(x-1)(x+3)} ; \{x \neq 1, -3\}$$

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

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

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

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

$$8) \frac{\frac{7}{x-2} + \frac{4}{x-3}}{\frac{2}{x-3}} \cdot (x-2)(x-3) = \frac{7(x-3) + 4(x-2)}{2(x-2)}$$

$$= \frac{7x - 21 + 4x - 8}{2(x-2)} = \frac{11x - 29}{2(x-2)} ; \{x \neq 2, 3\}$$