

MAT 142 Homework #1 Key

$$1. a. \frac{\frac{x}{3} - 1}{x - 3} \cdot \frac{(3)}{(3)} = \frac{x - 3}{3(x/3)} = \frac{1}{3}$$

$$b. \frac{\frac{1}{x+1}}{\frac{1}{x^2-2x-3} + \frac{1}{x-3}} \cdot \frac{(x+1)(x-3)}{(x+1)(x-3)} = \frac{x-3}{1+x+1} = \frac{x-3}{x+2}$$

$$c. \frac{1 + \frac{1}{x}}{3 - \frac{1}{x}} \cdot \frac{(x)}{(x)} = \frac{x+1}{3x-1}$$

$$d. \frac{x - \frac{x}{x+3}}{x+2} \cdot \frac{(x+3)}{(x+3)} = \frac{x^2+3x-x}{x^2+5x+6}$$

$$e. \frac{\frac{x+h}{x+h+1} - \frac{x}{x+1}}{h} = \frac{1}{h} \left[\frac{x+h}{x+h+1} - \frac{x}{x+1} \right] = \frac{x^2+2x}{x^2+5x+6} = \frac{x(x+2)}{(x+2)(x+3)} = \frac{x}{x+3}$$

$$= \frac{1}{h} \left[\frac{(x+h)(x+1) - x(x+h+1)}{(x+h+1)(x+1)} \right] = \frac{1}{h} \left[\frac{x^2+x+xh+h - x^2-xh-x}{(x+h+1)(x+1)} \right] =$$

$$\frac{1}{h} \left[\frac{h}{(x+h+1)(x+1)} \right] = \frac{1}{(x+h+1)(x+1)}$$

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

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

$$2a. \frac{7x+4}{-x-4} = \frac{x+16}{-x-4}$$

$$\frac{6x}{6} = \frac{12}{6}$$

$$\boxed{x=2}$$

$$b. 45 - [4 - 2y - 4(y+7)] = -4(1+3y) - [4 - 3(y+2) - 2(2y+5)]$$

$$45 - [4 - 2y - 4y - 28] = -4 - 12y - [4 - 3y - 6 - 4y - 10]$$

$$45 - [-6y - 24] = -4 - 12y - [-7y - 12]$$

$$45 + 6y + 24 = -4 - 12y + 7y + 12$$

$$6y + 69 = -5y + 8$$

$$+5y \quad -69 \quad +5y \quad -69$$