

MATH 103 EXAM #3 KEY (SUMMER 2011)

1a. $\frac{(v-6)(v+6)}{5(v+6)} = \frac{v-6}{5}$

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

2a. $\frac{u^3v^2}{15u^2v^4} \cdot \frac{5v^1}{12u^4v^2} = \frac{1}{3} \cdot \frac{v^7}{12u^3} = \frac{v^7}{36u^3}$

2b. $\frac{(z-1)(z+1)}{6z} \cdot \frac{2}{-(z-1)} = \frac{z+1}{3z} \cdot \frac{1}{-1} = -\frac{z+1}{3z}$

2c. $\frac{(t-7)(t+7)}{(t+7)(t-3)} \cdot \frac{(t+5)(t+3)}{(t-7)(t+5)} = \frac{1}{t-3} \cdot \frac{t+3}{1} = \frac{t+3}{t-3}$

3a. $\frac{28}{12y} + \frac{27}{12y} = \frac{55}{12y}$

3b. $\frac{x-3}{(x-3)(x+2)} - \frac{x+2}{(x-3)(x+2)} = \frac{x-3-(x+2)}{(x-3)(x+2)} = -\frac{5}{(x-3)(x+2)}$

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

4. $\frac{4 - \frac{1}{p}}{9 + \frac{5}{p}} \cdot \frac{p}{p} = \frac{4p-1}{9p+5}$

5a. $2x(x+1) \cdot \left(2 - \frac{5}{2x}\right) = 2x(x+1) \cdot \left(\frac{2x}{x+1}\right) \Rightarrow 4x(x+1) - 5(x+1) = 4x^2 \Rightarrow 4x^2 - x - 5 = 4x^2 \Rightarrow x = -5$

5b. $2x(x+3) + 4(x-3) = -24 \Rightarrow 2x^2 + 10x + 12 = 0 \Rightarrow x^2 + 5x + 6 = 0 \Rightarrow (x+3)(x+2) = 0 \Rightarrow x = -3, -2 \Rightarrow x = -2 \Rightarrow$ Solution set is $\{-2\}$.

6. $pqf \cdot \left(\frac{1}{p} + \frac{1}{q}\right) = \frac{1}{f} \cdot pqf \Rightarrow qf + pf = pq \Rightarrow pq - pf = qf \Rightarrow p(q-f) = qf \Rightarrow p = \frac{qf}{q-f}$

7.

	Rate	Time	Distance
East	500	$\frac{x}{500}$	x
West	350	$\frac{x}{350}$	x

The round-trip time was 8.5 hours, so we obtain the equation $\frac{x}{500} + \frac{x}{350} = 8.5$. Multiplying both sides by 3,500 gives: $7x + 10x = 29,750 \Rightarrow 17x = 29,750 \Rightarrow x = 1,750$ miles.

8.

	Rate	Time	Distance
Jerry	$\frac{1}{20}$	12	$\frac{12}{20}$
Tom	$\frac{1}{t}$	12	$\frac{12}{t}$

Let t be the time it would take Tom to do the job working alone. We get $\frac{12}{20} + \frac{12}{t} = 1 \Rightarrow \frac{3}{5} + \frac{12}{t} = 1 \Rightarrow 3t + 60 = 5t \Rightarrow t = 30$ hours.

9a. The second equation gives $y = 3 - 2x$, which we substitute into the first equation to get $3x - 2(3 - 2x) = 7 \Rightarrow 3x - 6 + 4x = 7 \Rightarrow 7x = 13 \Rightarrow x = 13/7$. Putting this into either equation in the system yields $y = -5/7$. Solution is $(\frac{13}{7}, -\frac{5}{7})$.

9b. The second equation gives $y = 5x$, which we substitute into the first equation to get $\frac{1}{4}x - \frac{1}{5}(5x) = 9 \Rightarrow 5x - 4(5x) = 180 \Rightarrow -15x = 180 \Rightarrow x = -12$. Putting this into either equation in the system yields $y = -60$. Solution is $(-12, -60)$.