Name: *Caleb McWhorter — Solutions*
MATH 101
Fall 2021
HW 14: Due 11/09

"Science is a way of thinking much more than it is a body of knowledge."

–Carl Sagan

Problem 1. (10pt) Compute the following, being sure to show all your work and simplifying as much as possible:

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

Solution.

$$\begin{aligned}\frac{5}{x-1} - \frac{4}{x+3} &= \frac{5(x+3)}{(x-1)(x+3)} - \frac{4(x-1)}{(x-1)(x+3)} \\ &= \frac{5(x+3)-4(x-1)}{(x-1)(x+3)} \\ &= \frac{5x+15-4x+4}{(x-1)(x+3)} \\ &= \frac{x+19}{(x-1)(x+3)}\end{aligned}$$

Problem 2. (10pt) Compute the following, being sure to show all your work and simplifying as much as possible:

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

Problem 3. (10pt) Compute the following, being sure to show all your work and simplifying as much as possible:

$$\frac{x}{x+6} + \frac{x-2}{x+3}$$

Problem 4. (10pt) Compute the following, being sure to show all your work and simplifying as much as possible:

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

Problem 5. (10pt) Compute the following, being sure to show all your work and simplifying as much as possible:

$$\frac{2}{x+3} \cdot \frac{x^2 - 2x - 15}{x - 1}$$

Problem 6. (10pt) Compute the following, being sure to show all your work and simplifying as much as possible:

$$\frac{x+3}{x^2-4x-12} \cdot \frac{x^2-4}{2x^2+5x-3}$$

Problem 7. (10pt) Compute the following, being sure to show all your work and simplifying as much as possible:

$$\frac{\frac{x}{x+1}}{\frac{x^2+4x}{x^2+3x+2}}$$

Problem 8. (10pt) Compute the following, being sure to show all your work and simplifying as much as possible:

$$\frac{\dfrac{x^2+x-6}{x^2+2x-24}}{\dfrac{2x^2+9x+9}{x^2+x-30}}$$