Section 3.1 – Practice Problems

Simplify the expressions, assume non-zero denominators

1. $\frac{x-1}{x-1}$

Same thing divided by itself

$\boxed{1}$

2. $\frac{x-1}{1-x}$

$\frac{x-1}{-(x-1)} = \boxed{-1}$

3. $\frac{x+1}{1+x}$

$\frac{x+1}{x+1} = \boxed{1}$

4. $\frac{x+2}{-2-x}$

$\frac{x+2}{-x-2} \rightarrow \frac{x+2}{-(x+2)} = \boxed{-1}$

5. $\frac{(x-1)(x+1)}{(1-x)(-x-1)}$

$\frac{(x-1)(x+1)}{(1-x)(-x-1)} \rightarrow \frac{(x-1)(x+1)}{(x-1)(-1)(x+1)}$

$\boxed{1}$

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

$\rightarrow \frac{-x+3}{x+3}$

DOES NOT SIMPLIFY

7. $\dfrac{(x-2)(x-1)(x+2)}{(2-x)(1-x)(2-x)}$

$\dfrac{(x-2)(x-1)(x+2)}{(-1)(x-2)(-1)(x-1)(-1)(x-2)}$

$\boxed{-\dfrac{(x+2)}{(x-2)}}$

8. $\dfrac{x^2-4}{4-x^2}$

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

$\boxed{-1}$

9. $\dfrac{x^2-2x+1}{-x^2+2x-1}$

$\dfrac{x^2-2x+1}{(-1)(x^2-2x+1)} \rightarrow \dfrac{(x-1)(x-1)}{(-1)(x-1)(x-1)}$

$\boxed{-1}$

10. $\dfrac{a-b+c}{b-c-a}$

$\dfrac{a-b+c}{(-1)a-b+c}$

$\boxed{-1}$

11. $\dfrac{8x}{14y}$

$\dfrac{2\cdot 4x}{2\cdot 7y} = \boxed{\dfrac{4x}{7y}}$

12. $\dfrac{15xy}{24x}$

$\dfrac{3\cdot 5xy}{3\cdot 8x} = \boxed{\dfrac{5y}{8}}$

13. $\frac{6(x+2)}{10(x+2)}$

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

$\boxed{\frac{3}{5}}$

14. $\frac{(x+1)(x-1)}{(x-1)^2}$

$\frac{(x+1)(x-1)}{(x-1)(x-1)} = \boxed{\frac{(x+1)}{(x-1)}}$

15. $\frac{x^2-xy}{x^2}$

$\frac{x(x-y)}{x^2} = \boxed{\frac{x-y}{x}}$

16. $\frac{2x^2-8x}{4-x}$

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

$\boxed{-2x}$

17. $\frac{x^3}{x^3+x^2y}$

$\frac{x^3}{x^2(x+y)} = \boxed{\frac{x}{(x+y)}}$

18. $\frac{4x^2+16x}{x^2-16}$

$\frac{4x(x+4)}{(x+4)(x-4)} = \boxed{\frac{4x}{(x-4)}}$

19. $\dfrac{x^2+2x}{x^2+3x+2}$

$\dfrac{x(x+2)}{(x+2)(x+1)} = \boxed{\dfrac{x}{x+1}}$

20. $\dfrac{x^2+9x+18}{x^2+6x}$

$\dfrac{(x+3)(x+6)}{x(x+6)}$

$\boxed{\dfrac{x+3}{x}}$

21. $\dfrac{2x^2+5x-3}{x^2-9}$

$\dfrac{(2x-1)(x+3)}{(x+3)(x-3)} = \boxed{\dfrac{(2x-1)}{(x-3)}}$

22. $\dfrac{3x^2-10x-8}{x^2-16}$

Ac Method →

$x^2-10x-24$

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

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

$\boxed{\dfrac{(3x+2)}{(x+4)}}$

Ac Method.

23. $\dfrac{2x^2+17x+35}{3x^2+19x+20}$ → $x^2+17x+70$

$(x+\frac{7}{2})(x+\frac{10}{2})$

$(2x+7)(x+5)$

$x^2+19x+60$

$(x+\frac{4}{3})(x+\frac{15}{3})$

$(3x+4)(x+5)$

$\dfrac{(2x+7)(x+5)}{(3x+4)(x+5)}$

$\boxed{\dfrac{2x+7}{3x+4}}$

24. $\dfrac{5x^2-32x+12}{4x^2-27x+18}$

$x^2-32x+60$

$(x-\frac{2}{5})(x-\frac{30}{5})$

$x^2-27x+72$

$(x-\frac{24}{4})(x-\frac{3}{4})$

$(x-6)(4x-3)$

$\dfrac{(5x-2)(x-6)}{(4x-3)(x-6)}$

$\boxed{\dfrac{5x-2}{4x-3}}$

25. $\frac{7x^2+61x-18}{7x^2+19x-6}$

$x^2+61x-126$

$(x+\frac{63}{7})(x-\frac{2}{7})$

$x^2+19x-42$

$(x-\frac{2}{7})(x+\frac{21}{7})$

$(7x-2)(x+3)$

$\frac{(x+9)(7x-2)}{(x+3)(7x-2)}$

$\boxed{\frac{x+9}{x+3}}$

26. $\frac{8x^2-51x+18}{8x^2+29x-12}$

$\rightarrow x^2-51x+144$

$(x-\frac{3}{8})(x-\frac{48}{8})$

$(8x-3)(x-6)$

$x^2+29x-96$

$(x+\frac{32}{8})(x-\frac{3}{8})$

$(x+4)(8x-3)$

$\boxed{\frac{x-6}{x+4}} \Leftarrow \frac{(8x-3)(x-6)}{(8x-3)(x+4)}$

144 = 2 × 72 = 2 × 2 × 36 = 2 × 2 × 3 × 12

96 = 2 × 48 = 2 × 2 × 24 = 2 × 2 × 2 × 12 = 2 × 2 × 2 × 6 = 2 × 2 × 2 × 3

27. $\frac{3x-21}{28-4x}$

$\frac{3(x-7)}{-4(x-7}$

$\boxed{\frac{-3}{4}}$

28. $\frac{x^2+7x-18}{12-4x-x^2}$

$\frac{(x+9)(x-2)}{(-1)x^2+4x-12} \rightarrow \frac{(x+9)(x-2)}{(-1)(x+6)(x-2)}$

$\boxed{-\frac{(x+9)}{(x+6)}}$

29. $\frac{x^2+2xy-3y^2}{2x^2-xy-y^2}$

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

$\boxed{\frac{x+3y}{2x+y}}$

30. $\frac{x^2-3xy+2y^2}{x^2-4y^2}$ ← Diff of Squares

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

$\boxed{\frac{x-y}{x+2y}}$