SM3 3.1: Rational Operations

Pg. 313: Simplify; state restrictions.

1) $\frac{35x}{7x}$

$5; x \neq 0$

2) $\frac{3x+12}{2x+8}$

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

$\frac{3}{2}; x \neq -4$

3) $\frac{x^2+7x}{x} = \frac{x(x+7)}{x}$

$x+7; x \neq 0$

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

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

$6x^3-2x+3; x \neq 0$

5) $\frac{8+2x}{2x^2+10x+8}$

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

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

$\frac{1}{x+1}; x \neq \{-4,-1\}$

6) $\frac{2x^3+13x^2-7x}{x^2+7x}$

$\frac{x(2x^2+13x-7)}{x(x+7)}$

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

$2x-1; x \neq \{-7,0\}$

7) $\frac{x^3-6x^2-7x}{x^2+4x+3}=\frac{x^2-7x}{x+3}$

$\frac{x(x^2-6x-7)}{(x+3)(x+1)}=\frac{x(x-7)}{x+3}$

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

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

The left expression has restriction
$x \neq -1, -3$

8) $\frac{3x^2-8x}{5x}$

$\frac{x(3x-8)}{5x}$

$\frac{3x-8}{5}; x \neq 0$

9) $2 \cdot \frac{4x-8}{3x-6}$

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

$\frac{8}{3}; x \neq 2$

10)

$\frac{x^2-x-6}{x+2}$	$\frac{x^2+x-20}{2x+10}$	$\frac{6x^2-96}{48+12x}$	$\frac{2x-6}{2}$
$\frac{(x+2)(x-3)}{x+2}$	$\frac{(x+5)(x-4)}{2(x+5)}$	$\frac{6(x^2-16)}{12(x+4)}$	$\frac{2(x-3)}{2}$
		$\frac{6(x+4)(x-4)}{12(x+4)}$	
$x-3; x \neq -2$	$\frac{x-4}{2}; x \neq -5$	$\frac{x-4}{2}; x \neq -4$	$x-3$

The first and last expressions are equivalent. The two inner expressions are equivalent.

Pg. 320: Simplify; state restrictions.

11) $\frac{22}{5x}; x \neq 0$

12) $\frac{x^2 - 11x + 11}{x - x^2}; x \neq \{0,1\}$

13) $\frac{x^3+3x-32}{8x}; x \neq 0$

14) $\frac{x^2 + x + 5}{5x}; x \neq 0$

15) $\frac{5x^2 + 14x}{x + 1}; x \neq -1$

16) $\frac{5x^2 - 7x + 1}{x^2 - x - 2}; x \neq \{-1,2\}$

17) $\frac{33x^2+11x+13}{6x^2-7x-3}; x \neq \{\frac{-1}{3}, \frac{3}{2}\}$

18) $\frac{8x + 17}{24}$

19) $\frac{4x^2 + 35x - 3}{x + 7}; x \neq -7$

20) $\frac{12x^2 + 40x + 32}{5x + 15} x \neq -3$

Pg. 326: Simplify; state restrictions.

21) $\frac{5}{2x^2 + 3}; x \neq 0$

22) $\frac{2x^2 + 7x}{x^2 - 2x - 3}; x \neq \{-1, 3\}$

23) $\frac{x^3 + 3x^2 + x + 3}{x^2 - 4x}; x \neq \{0,4\}$

24) $\frac{x + 2}{15}; x \neq 0$

25) $\frac{x + 2}{-x + 5}; x \neq \{-3,5,6\}$

26) $x \neq \{-5, -2\}$

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

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

$x + 3; x \neq \{-1,0,1\}$

28) $\frac{2x^2+x}{2x-10}; x \neq 5$

29) $\frac{x^2+4x+4}{x-3}$

30) $\frac{7x^2+42x}{x+7}; x \neq -7$

Pg. 334: Simplify; state restrictions.

31) $\frac{2x^2}{7}$

32) $\frac{3}{25}; x \neq 0$

33) $\frac{72x+27}{5x}; x \neq 0$

34) $\frac{2x^2-8}{x+x^2}; x \neq \{-1,0\}$

35) $\frac{x^2-2x-15}{2x^2-8x} \cdot \frac{32-2x^2}{x^2-13x+40} \div \frac{x+4}{8x-x^2}$

$\frac{x^2-2x-15}{2x^2-8x} \cdot \frac{32-2x^2}{x^2-13x+40} \cdot \frac{8x-x^2}{x+4}$

$\frac{(x-5)(x+3)}{2x(x-4)} \cdot \frac{-2(x+4)(x-4)}{(x-5)(x-8)} \cdot \frac{-x(x-8)}{x+4}$

$x+3; x \neq \{-4,0,4,5,8\}$

36) $2x+3$

37) $x-9+\frac{8}{x+1}$

38) $\frac{2x+4}{3}$

39) $\frac{15x^2+25x}{x^2-16}$

40) $\frac{2x^3-8x^2+16x-10}{x^3-2x^2-5x+10}$