

099 § 6.1 #s 1, 5, 9, 13, 17, 19, 23*, 40, 49, 53

See Examples 3 & 4 $-\frac{a}{b} = \frac{-a}{b} = \frac{a}{-b}$

#s 1-10 Find the domain of each rational expression.

$$\textcircled{1} f(x) = \frac{5x-7}{4} \Rightarrow D = \{x \mid x \text{ is real}\}$$

(4 is never = 0)

$$\textcircled{2} f(x) = \frac{3x}{7-x} \Rightarrow D = \{x \mid x \text{ is real and } 7-x \neq 0\}$$

$$D = \{x \mid x \text{ is real and } x \neq 7\}$$

$$\textcircled{9} R(x) = \frac{3+2x}{x^3+x^2-2x} \quad D = \{x \mid x^3+x^2-2x \neq 0\}$$

$$x^3+x^2-2x=0$$

$$x(x^2+x-2)=0$$

$$x(x+2)(x-1)=0$$

$$x = -2, 0, 1$$

$$D = \{x \mid x \neq -2 \text{ and } x \neq 0 \text{ and } x \neq 1\}$$

#s 13-32 Simplify each rational expression.

$$\textcircled{13} \frac{8x-16x^2}{8x} = \frac{8x(1-16x)}{8x} = \frac{1-16x}{1} \cdot \frac{8x}{8x} = \boxed{1-16x}$$

$$\textcircled{17} \frac{9y-18}{7y-14} = \frac{9(y-2)}{7(y-2)} = \frac{9}{7} \cdot \frac{y-2}{y-2} = \frac{9}{7}$$

$$\textcircled{19} \frac{x^2+6x-40}{x+10} = \frac{(x-4)(x+10)}{x+10} = \frac{x-4}{1} \cdot \frac{x+10}{x+10} = \boxed{x-4}$$

099 \int 6.1 #s 23, 40, 49, 53

$$\begin{aligned} \textcircled{23} \quad \frac{x^2-49}{7-x} &= \frac{(x-7)(x+7)}{7-x} = \frac{(x-7)(x+7)}{-1(x-7)} \\ &= \frac{x+7}{-1} \cdot \frac{x-7}{x-7} = \frac{x+7}{-1} = \boxed{-(x+7)} \text{ OR } -x-7 \end{aligned}$$

#s 33-44 Multiply & Simplify

$$\textcircled{40} \quad \frac{x^2-3x+9}{5x^2-20x-105} \cdot \frac{x^2-49}{x^3+27}$$

$$\begin{aligned} x^2-3x+9 &\text{ DNF} \\ 5x^2-20x-105 & \\ = 5(x^2-4x-21) & \\ = \boxed{5(x-7)(x+3)} & \\ x^2-49 & \\ = \boxed{(x-7)(x+7)} & \\ x^3+27 & \\ = x^3+3^3 & \\ = \boxed{(x+3)(x^2-3x+9)} & \end{aligned}$$

$$\begin{aligned} &= \frac{x^2-3x+9}{5(x-7)(x+3)} \cdot \frac{(x-7)(x+7)}{(x+3)(x^2-3x+9)} \\ &= \frac{x^2-3x+9}{x^2-3x+9} \cdot \frac{x-7}{x-7} \cdot \frac{x+7}{5(x+3)(x+3)} \\ &= \frac{x+7}{5(x+3)(x+3)} = \boxed{\frac{x+7}{5(x+3)^2}} \\ &\text{FINAL ANS} \end{aligned}$$

#s 45-56 Divide & Simplify

$$\begin{aligned} \textcircled{49} \quad \frac{x^2-6x+9}{x^2-x-6} \cdot \frac{x^2-9}{4} &= \frac{x^2-6x+9}{x^2-x-6} \cdot \frac{4}{x^2-9} \\ &= \frac{(x-3)^2}{(x-3)(x+2)} \cdot \frac{4}{(x-3)(x+3)} = \frac{4(x-3)^2}{(x-3)^2(x+2)(x+3)} \\ &= \boxed{\frac{4}{(x+2)(x+3)}} \end{aligned}$$

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$$\textcircled{53} \quad \frac{3x-x^2}{x^3-27} \cdot \frac{x}{x^2+3x+9}$$

$$= \frac{3x-x^2}{x^3-27} \cdot \frac{x^2+3x+9}{x}$$

$$= \frac{-x(3-x)(x^2+3x+9)}{(x-3)(x^2+3x+9) \cdot x} = \frac{x(-1)(x-3)(x^2+3x+9)}{x(x-3)(x^2+3x+9)}$$

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

Misc

$$\textcircled{58} \quad \frac{x^2-4}{9} \cdot \frac{x^2-6x+9}{x^2-5x+6}$$

$$= \frac{(x-2)(x+2)(x-3)^2}{9(x-3)(x-2)} = \frac{(x+2)(x-3)}{9} \leftarrow$$

NOTE: $\frac{(x-3)^2}{x-3} = \frac{(x-3)^2}{(x-3)^1} = (x-3)^{2-1} = (x-3)^1 = \boxed{x-3}$