099 S6.5 #s 1, 4, 5, 6, 9, 12, 15, 19, 22, 30

#s 1 - END Solve each equation

(1) $\frac{x}{2} - \frac{x}{3} = 12$ LCD $= 2 \cdot 3 = 6$

METHOD 1

$\frac{x}{2} \cdot \frac{3}{3} - \frac{x}{3} \cdot \frac{2}{2} = \frac{12}{1} \cdot \frac{2 \cdot 3}{2 \cdot 3}$

$\frac{3x - 2x}{6} = \frac{72}{6}$

$\frac{x}{6} = \frac{72}{6}$

$x = 72$

METHOD 2

$\frac{x}{2} \cdot \frac{2 \cdot 3}{1} - \frac{x}{3} \cdot \frac{2 \cdot 3}{1} = \frac{12}{1} \cdot \frac{2 \cdot 3}{1}$

$3x - 2x = 72$

$x = 72$

Method 2 is quicker, but Method 1 is going to be needed in MAT 121.

(4) $\frac{x}{2} = \frac{21}{10} - \frac{x}{5}$ LCD $= 10 = 2 \cdot 5$

$\frac{x}{2} \cdot \frac{2 \cdot 5}{1} = \frac{21}{10} \cdot \frac{2 \cdot 5}{1} - \frac{x}{5} \cdot \frac{2 \cdot 5}{1}$

$5x = 21 - 2x$

$7x = 21$

$x = \frac{21}{7} = 3 = x$

(5) $\frac{2}{x} + \frac{1}{2} = \frac{5}{x}$ LCD $= 2x$

$\left(\frac{2}{x}\right)(2x) + \left(\frac{1}{2}\right)(2x) = \left(\frac{5}{x}\right)(2x)$

$4 + x = 10$

$x = 6$

099 §6.5 #s 6, 9, 12, 15, 19, 22, 30

(6) $\frac{5}{3x} + 1 = \frac{7}{6}$ LCD $= 3 \cdot 2 \cdot x$

$3 \cdot x$ $\quad$ $3 \cdot 2$

$\frac{5}{3x} \cdot \frac{2 \cdot 3 \cdot x}{1} + 1 \cdot 3 \cdot 2 \cdot x = \frac{7}{6} \cdot \frac{3 \cdot 2 \cdot x}{1}$

$10 + 6x = 7x$

$-x = -10$

$x = 10$ $\quad$ $x \in \{10\}$

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

$x + 5 = 2$

$x = -3$ BUT $x = -3$ isn't in the domain!

$x = -3$ Makes denominator zero. FINAL ANS: $\emptyset$

(12) $\frac{1}{x-1} + \frac{1}{x+1} = \frac{2}{x^2-1}$ LCD $= (x-1)(x+1)$

$(x-1)(x+1)$

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

$x + 1 + x - 1 = 2$ $\quad$ $x = 1$ Makes denominator zero.

$2x = 2$

$x = 1$ $\quad$ $\therefore \emptyset$ is final answer.

099 §6.5 #s 15, 19, 22, 30

(15) $\dfrac{x^2-23}{2x^2-5x-3} + \dfrac{2}{x-3} = \dfrac{-1}{2x+1}$

$(2x+1)(x-3) = 2x^2-6x+x-3 = 2x^2-5x-3$ ✓

LCD $= (2x+1)(x-3)$

$$\frac{x^2-23}{(2x+1)(x-3)} \cdot \frac{(2x+1)(x-3)}{1} + \frac{2}{x-3} \cdot \frac{(2x+1)(x-3)}{1} = \frac{-1}{2x+1} \cdot \frac{(2x+1)(x-3)}{1}$$

$x^2-23+2(2x+1) = -1(x-3)$

$x^2-23+4x+2 = -x+3$

$x^2+5x-24 = 0$

$(8)(-3) = -24$

$8-3 = 5$

$x^2+8x-3x-24 = 0$

$x(x+8)-3(x+8) = 0$

$(x+8)(x-3) = 0$ → Not in domain!

$x = -8$ or $x = 3$

$x \in \{-8\}$

099 §6.5 #5 19, 22, 30

(19) $\frac{1}{x-4} = \frac{8}{x^2-16}$ LCD $= (x-4)(x+4)$

$(x-4)(x+4)$

$$\frac{1}{x-4} \cdot \frac{(x-4)(x+4)}{1} = \frac{8}{(x-4)(x+4)} \cdot \frac{(x-4)(x+4)}{1}$$

$1(x+4) = 8$

$x+4 = 8$

$x = -4 \notin D \Longrightarrow \boxed{\varnothing}$

(22) $\frac{12}{3x^2+12x} = 1 - \frac{1}{x+4}$ LCD $= 3x(x+4)$

$3x(x+4)$

$$\frac{12}{3x(x+4)} \cdot \frac{3x(x+4)}{1} = (1)(3x(x+4)) - \frac{1}{x+4} \cdot \frac{3x(x+4)}{1}$$

$12 = 3x(x+4) - 3x$

$12 = 3x^2 + 12x - 3x$

$3x^2 + 9x - 12 = 0$

$3(x^2 + 3x - 4) = 0$

$x^2 + 3x - 4 = 0$

$(x+4)(x-1) = 0$

$x = -4 \notin D$

OR $x = 1$

$\boxed{x \in \{1\}}$

099 §6.5 # 30

(30) $\frac{2}{x-5} + \frac{1}{2x} = \frac{5}{3x^2-15x}$ $\qquad$ LCD $= 2 \cdot 3 \cdot x \cdot (x-5)$

$3x(x-5)$

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

$12x + 3(x-5) = 5(2)$

$12x + 3x - 15 = 10$

$15x = 25$

$x = \frac{25}{15} = \frac{5}{3} \cdot \frac{5}{5} = \frac{5}{3} = x$

$x \in \{\frac{5}{3}\}$