

1) The Common Factor (GCF) and the Least Common Multiple (LCM)

of

i) 420 and 392 is $\boxed{28}$

ii) 1456 and 2160 is $\boxed{16}$

2) Simplify

i) $\frac{1}{420} + \frac{1}{392} = \frac{15-14}{28} = \boxed{\frac{1}{28}}$

ii) $\frac{18}{99} + \frac{120}{22} - \frac{10}{121} = \frac{22 \times 18 + 99 \times 120 - 18 \times 10}{2 \times 9 \times 11 \times 11} = \boxed{\frac{12096}{2178}}$

iii) $\frac{4}{7} + \frac{12}{28} - \frac{9}{35} = \frac{20 \times 4 + 5 \times 12 - 4 \times 9}{4 \times 5 \times 7} = \frac{104}{140} = \boxed{\frac{26}{35}}$

3) Simplify

1)
$$1 - \frac{1}{1 + \frac{1}{2}} + \frac{1}{1 + \frac{1}{1 - \frac{1}{2}}} = \frac{1}{1 - \frac{2}{3}} = \boxed{\frac{3}{2}}$$

2)
$$3 + \frac{1}{2 + \frac{3}{7 - \frac{4}{5 - \frac{3}{47}}}} = \frac{3 + \frac{4}{11}}{7 - \frac{4}{(-\frac{1}{10})}} = \frac{3 + \frac{4}{11}}{7 + \frac{40}{37}} = \frac{37}{11} = \boxed{\frac{1739}{11}}$$

4) Solve (find x)

1) $\frac{10}{2x-4} + \frac{4}{x} = \frac{5}{x-2}$
 $\Leftrightarrow \frac{10 \times x + 4(2x-4)}{2(x-2)x} = \frac{5x}{2(x-2)x} \Leftrightarrow 10x + 4(2x-4) = 5x$
 (assuming $x \neq 2$ and $x \neq 0$)
 $\Leftrightarrow (2x-4) = 0 \Leftrightarrow x = 2$, impossible $\Rightarrow \boxed{S = \emptyset}$

2) $1 - \frac{3x+3}{3x+4} = \frac{1}{3x+4}$
 $\Leftrightarrow \frac{(3x+4) - (3x+3)}{3x+4} = \frac{1}{3x+4} \Leftrightarrow (3x+4) - (3x+3) = 1$
 (assuming $x \neq -\frac{4}{3}$) $\Rightarrow \boxed{S = \mathbb{R} \setminus \{-\frac{4}{3}\}}$