Solve the rational equation for x by **clearing the denominators**

1)

$$\begin{aligned}
\frac{1}{7} - \frac{4}{7x} &= \frac{6}{x} + \frac{51}{35} \\
\left(\frac{1}{7}\right)\left(35x\right) - \left(\frac{4}{7x}\right)\left(35x\right) &= \left(\frac{6}{x}\right)\left(35x\right) + \left(\frac{51}{35}\right)\left(35x\right) \\
\left(\frac{1}{1}\right)\left(5x\right) - \left(\frac{4}{1}\right)\left(5\right) &= \left(\frac{6}{1}\right)\left(35\right) + \left(\frac{51}{1}\right)\left(x\right) \\
5x - 20 &= 210 + 51x \\
-230 &= 46x \\
x &= \frac{-230}{46} \\
x &= -5
\end{aligned}$$

Check to see that this does not give a zero denominator in the original equation: the solution is $x = -5$

2)

$$\begin{aligned}
\frac{1}{8} + \frac{7}{x-3} &= 1 \\
\left(\frac{1}{8}\right)\left(8(x-3)\right) + \left(\frac{7}{x-3}\right)\left(8(x-3)\right) &= 1 \cdot 8(x-3) \\
x - 3 + 7(8) &= 8(x-3) \\
x - 3 + 56 &= 8x - 24 \\
x + 53 &= 8x - 24 \\
77 &= 7x \\
11 &= x
\end{aligned}$$

Check to see that this does not give a zero denominator in the original equation: the solution is $x = 11$

3)

$$\begin{aligned}
\frac{24}{t-6} - \frac{144}{t^2-6t} &= -4 \\
\left(\frac{24}{t-6}\right)\left(t(t-6)\right) - \left(\frac{144}{t(t-6)}\right)\left(t(t-6)\right) &= -4t(t-6) \\
24t - 144 &= -4t^2 + 24t \\
4t^2 - 144 &= 0 \\
4t^2 &= 144 \\
t^2 &= 36 \\
t &= \pm\sqrt{36} = \pm 6 \text{ by the Square Root Property}
\end{aligned}$$

So there are two candidates for solutions: $t = 6$ or $t = -6$
By checking in the original equation, we see that $t = 6$ gives a zero denominator, so it is not a solution. (Such "solutions" are sometimes called '="extraneous".) The other candidate works when we check, so there is one solution:
$x = -6$