

The equation we need to solve in order to figure out the solution to the problem is

$$\begin{aligned}
\frac{35}{70} * 60 - \frac{35}{70+x} * 60 &= 10 \\
(35 * 60) * \left(\frac{1}{70} - \frac{1}{70+x} \right) &= 10 \\
\frac{1}{70} - \frac{1}{70+x} &= \frac{10}{35 * 60} \\
\frac{70+x}{70} - 1 &= \frac{(70+x) * 10}{35 * 60} \\
70+x-70 &= 70 * \frac{(70+x) * 10}{35 * 60} \\
x &= \frac{(70 * 10) * (70+x)}{35 * 60} \\
x &= \frac{70 * 10 * 70}{35 * 60} + \frac{70 * 10 * x}{35 * 60} \\
x - \frac{70 * 10 * x}{35 * 60} &= \frac{70 * 10 * 70}{35 * 60} \\
x * \left(1 - \frac{70 * 10}{35 * 60} \right) &= \frac{70 * 10 * 70}{35 * 60} \\
x &= \frac{\frac{70 * 10 * 70}{35 * 60}}{\left(1 - \frac{70 * 10}{35 * 60} \right)}
\end{aligned}$$

Solving this equation with the given specific values gives $x = 35$. This means that we must travel at a speed of 105 miles per hour in order to shave off 10 minutes from a drive of 35 miles when the speed limit is 70!