

Simultaneous Inequalities

Sometimes it is required that we find a set of numbers that satisfy two inequalities simultaneously. Suppose we have to find x such that

$$5 < 3x - 1 < 14$$

$$0 < 2x - 2 < 10$$

From the first of these, $5 + 1 < 3x < 14 + 1 \rightarrow \frac{5+1}{3} < x < \frac{14+1}{3} \&$

Hence $2 < x < 5$

From the second, $0 + 2 < 2x < 10 + 2 \rightarrow \frac{0+2}{2} < x < \frac{10+2}{2} \&$

Hence $1 < x < 6$

x must satisfy both inequalities. From the first $2 < x$ and from the second $1 < x$. This last requirement is redundant since if $2 < x$, $1 < x$ is satisfied. Also, there are some numbers eg 1.5, that satisfy the second inequality but not the first, so do not satisfy both.

Similarly $x < 5$ and $x < 6$. The second of these is again redundant. The set of values of x that satisfy both inequalities is $2 < x < 5$.