Review of Interval Notation and Inequalities

Interval Notation

You can describe intervals of convergence as inequalities or by using interval notation. The conventions for writing down intervals using inequalities and interval notation are summarized in Table 1 (below). Square brackets ("[" or "]") indicate that the endpoint(s) are included, and rounded parentheses ("(" or ")") indicate that the endpoint(s) are **not** included.

Description in words	Inequality	Interval notation
All values between $x = a$ and $x = b$, not including either $x = a$ or $x = b$.	$a < x < b$	(a, b)
All values between $x = a$ and $x = b$, including $x = a$ but not including $x = b$.	$a \le x < b$	$[a, b)$
All values between $x = a$ and $x = b$, including $x = b$ but not including $x = a$.	$a < x \le b$	$(a, b]$
All values between $x = a$ and $x = b$, including both $x = a$ and $x = b$.	$a \le x \le b$	$[a, b]$

Table 1: Translating between inequalities and interval notation.

Example

Figure 1 (see next page) shows the graph of the function $f(x)$. Find the domain and range of the function $f(x)$.

Solution

Figure 2 (see next page) shows the domain (purple) and range (green) of $f(x)$ drawn onto the x- and y-axis. Note that an open dot means that the point is missing.

The domain can be written as the collection of inequalities:

$$0 < x < 6 \text{ AND } 6 < x \le 10 \text{ AND } 13 \le x < 20.$$

or as the collection of intervals:

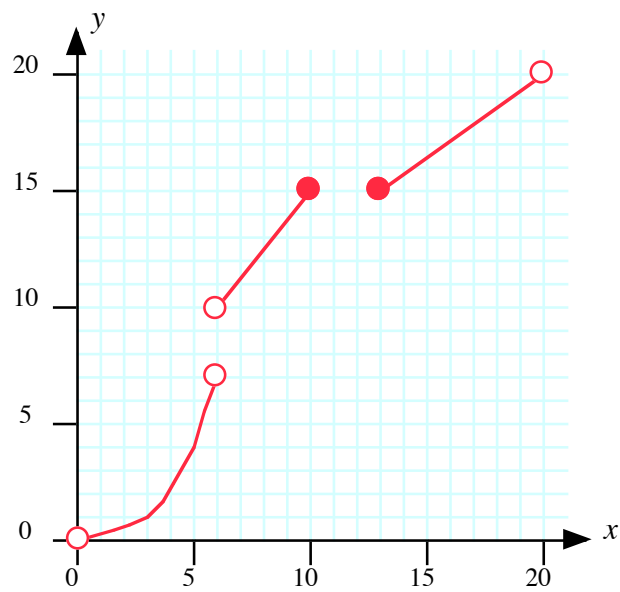$$(0, 6) \text{ AND } (6, 10] \text{ AND } [13, 20).$$

Figure 1: Graph of the function $f(x)$.

The range can be written as the collection of inequalities:

$$0 < y < 7 \text{ AND } 10 < y < 20.$$
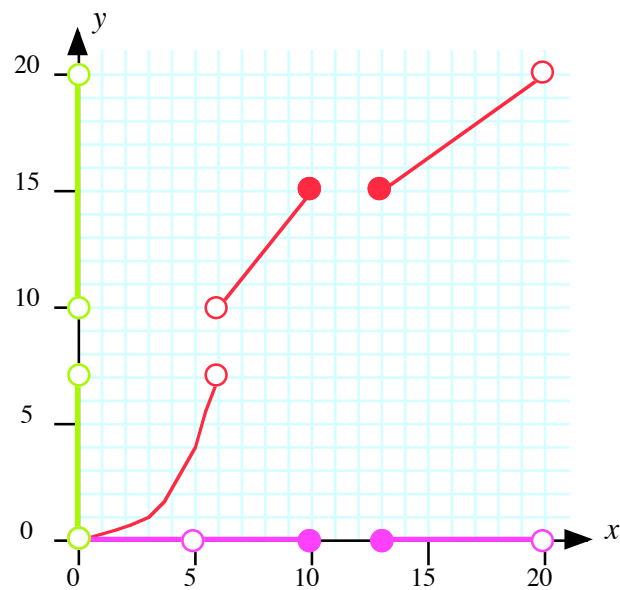
or as the collection of intervals:

$$(0, 7) \text{ AND } (10, 20).$$

Figure 2: The domain (purple) and range (green) of $f(x)$.