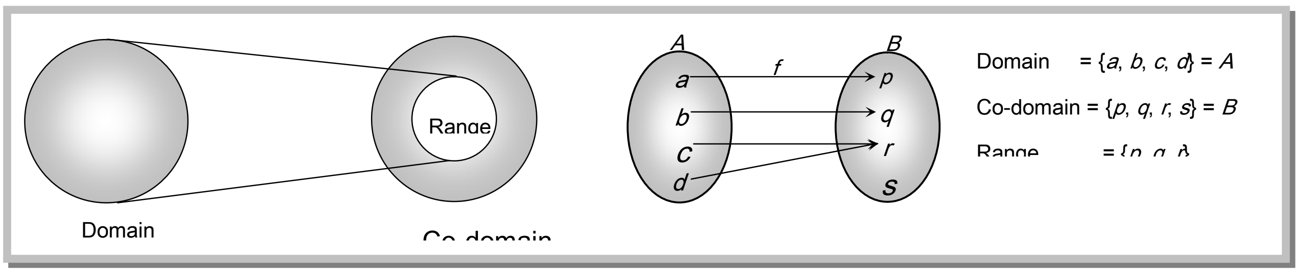
Domain, Co-domain and Range of Function.

If a function *f* is defined from a set of *A* to set *B* then for $f : A \rightarrow B$ set *A* is called the domain of function *f* and set *B* is called the co-domain of function *f*. The set of all *f*-images of the elements of *A* is called the range of function *f*.

In other words, we can say Domain = All possible values of *x* for which *f*(*x*) exists.

Range = For all values of *x*, all possible values of *f*(*x*).



(1) **Methods for finding domain and range of function**

(i) *Domain*

(a) Expression under even root (*i.e.*, square root, fourth root etc.) ≥ 0

(b) Denominator ≠ 0.

(c) If domain of $y = f(x)$ and $y = g(x)$ are D_1 and D_2 respectively then the domain of $f(x) \pm g(x)$ or $f(x).g(x)$ is $D_1 \cap D_2$.

(d) While domain of $\frac{f(x)}{g(x)}$ is $D_1 \cap D_2 - \{g(x) = 0\}$.

(e) Domain of $\left(\sqrt{f(x)}\right) = D_1 \cap \{x : f(x) \geq 0\}$

(ii) **Range:** Range of $y = f(x)$ is collection of all outputs $f(x)$ corresponding to each real number in the domain.

(a) If domain ∈ finite number of points ⇒ range ∈ set of corresponding $f(x)$ values.

(b) If domain ∈ *R* or *R* – [some finite points]. Then express *x* in terms of *y*. From this find *y* for *x* to be defined (*i.e.*, find the values of *y* for which *x* exists).

(c) If domain $\in$ a finite interval, find the least and greatest value for range using monotonicity.

Important Tips

☞ *If f(x) is a given function of x and if a is in its domain of definition, then by f(a) it means the number obtained by replacing x by a in f(x) or the value assumed by f(x) when x = a.*

☞ *Range is always a subset of co-domain.*