Domain and range:

A function's domain has all possible input (x) values.

A function's range has all possible output (y) values.

Example 1: $f(x) = \frac{1}{x}$'s domain is $(-\infty,0)\cup(0, \infty)$, and it's range is also $(-\infty,0)\cup(0, \infty)$. Graph this function and verify its domain and range.

Example 2: $g(x) = \sqrt{x}$'s domain is $[0, \infty)$, and it's range is also $[0, \infty)$. Graph this function to verify its domain and range.

Example 3: $h(x) = \sqrt[3]{x}$'s domain is $(-\infty, \infty)$, and it's range is also $(-\infty, \infty)$. Graph this function to verify its domain and range.

Function	Domain
$f(x) = 2x$	
$f(x) = x^2 + 1$	
$f(x) = \frac{1}{x+1}$	
$f(x) = \frac{2}{100-x} + 1$	
$f(x) = -\frac{1}{x^2 + x}$	
$f(x) = \frac{1}{x^3 + x^2 - 6x} - 2$	
$f(x) = \frac{1}{x^2 + 1}$	
$f(x) = \sqrt{x^2}$	
$f(x) = (\sqrt{x})^2$	
$f(x) = \sqrt{x+1}$	
$f(x) = \sqrt{x-1} + 5$	
$f(x) = -\sqrt{x-1} + 5$	
$f(x) = \sqrt{-x}$	
$f(x) = \frac{1}{\sqrt{x+1}}$	
$f(x) = 3 \cdot \sqrt[6]{2x-6}$	
$f(x) = 4 \cdot \sqrt[3]{-x} + 1$	
$f(x) = 4 \cdot \sqrt[4]{-x} + 1$	

Solutions are on the next page.

Solutions:

Function	Domain
$f(x)=2x$	$(-\infty, \infty)$
$f(x)=x^2+1$	$(-\infty, \infty)$
$f(x)=\frac{1}{x+1}$	$(-\infty, -1)\cup(-1, \infty)$
$f(x)=\frac{2}{100-x}+1$	$(-\infty, 100)\cup(100, \infty)$
$f(x)=-\frac{1}{x^2+x}$	$(-\infty, -1)\cup(-1, 0)\cup(0, \infty)$
$f(x)=\frac{1}{x^3+x^2-6x}-2$	$\{x \mid x\in R, x\neq -3, 0, 2\}$
$f(x)=\frac{1}{x^2+1}$	$(-\infty, \infty)$
$f(x)=\sqrt{x^2}$	$(-\infty, \infty)$
$f(x)=(\sqrt{x})^2$	$[0, \infty)$
$f(x)=\sqrt{x+1}$	$[-1, \infty)$
$f(x)=\sqrt{x-1}+5$	$[1, \infty)$
$f(x)=-\sqrt{x-1}+5$	$[1, \infty)$
$f(x)=\sqrt{-x}$	$(-\infty, 0]$
$f(x)=\frac{1}{\sqrt{x+1}}$	$(-1, \infty)$
$f(x)=3\cdot\sqrt[6]{2x-6}$	$[3, \infty)$
$f(x)=4\cdot\sqrt[3]{-x}+1$	$(-\infty, \infty)$
$f(x)=4\cdot\sqrt[4]{-x}+1$	$(-\infty, 0]$