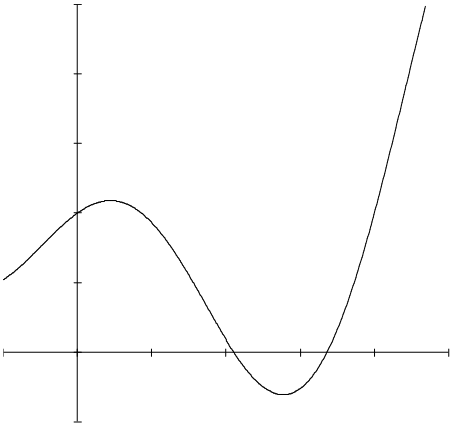
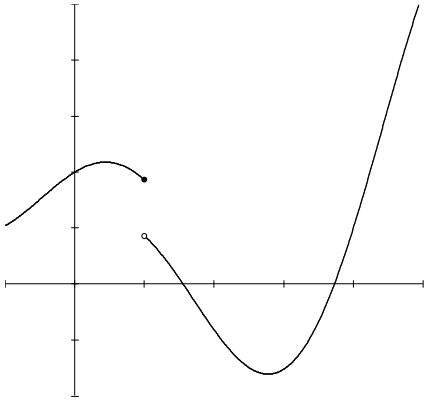
2.4 Limits and Continuity





Definition of Continuity:

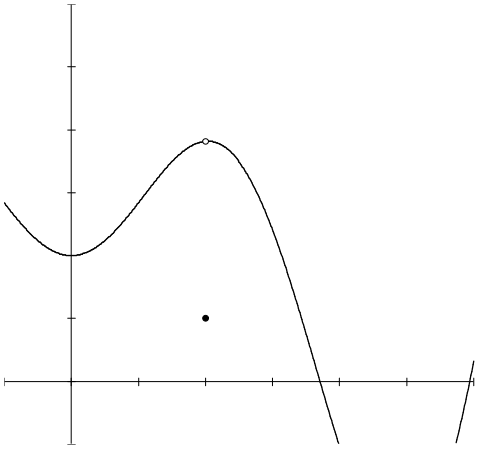
A function *f* is continuous at *c* if the following 3 conditions are met.

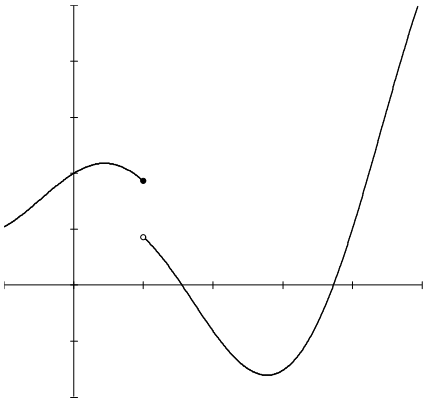
1.

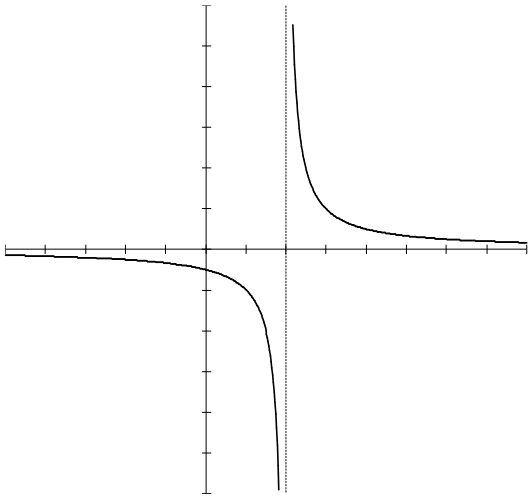
2.

3.

Discontinuities:

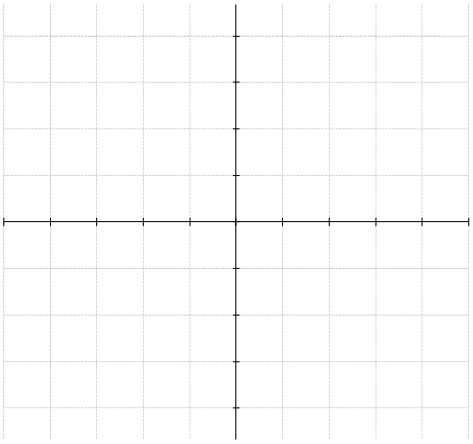




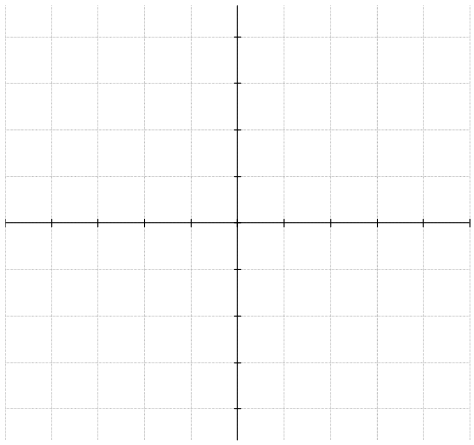


1. Determine if the following functions are continuous. If a discontinuity exists determine the type.

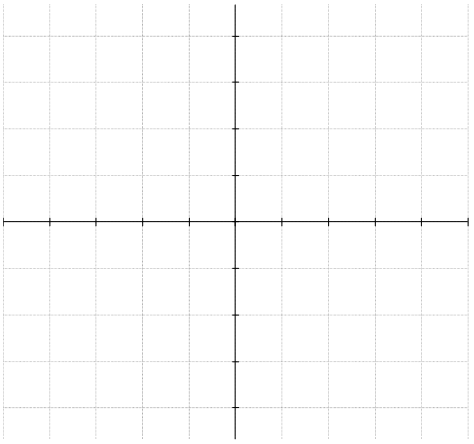
a) $f(x) = \frac{1}{x}$



b) $f(x) = \frac{x^2-1}{x-1}$



c) $f(x) = \sin x$



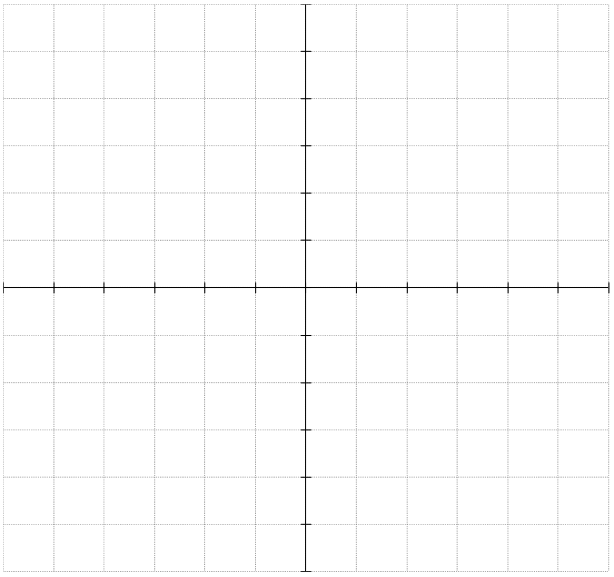
Definition: **One Sided Continuity**

A function $f(x)$ is called

Left continuous at $x = c$ if

Right continuous at $x = c$ if

2. Discuss the continuity of the function. $F(x) = \begin{cases} x & x < 0 \\ x^2, & 0 \le x \le 2 \\ 5 & x > 2 \end{cases}$

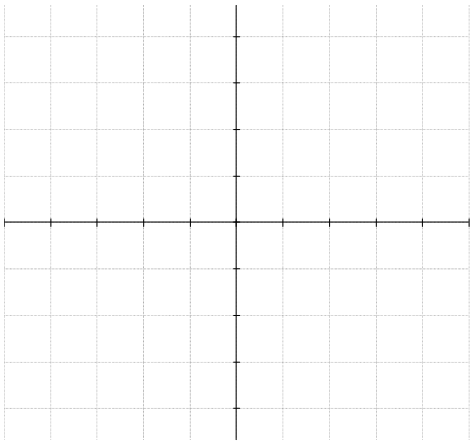


Laws of Continuity: If $f(x)$ and $g(x)$ are continuous at *x=c* then the following functions are also continuous.

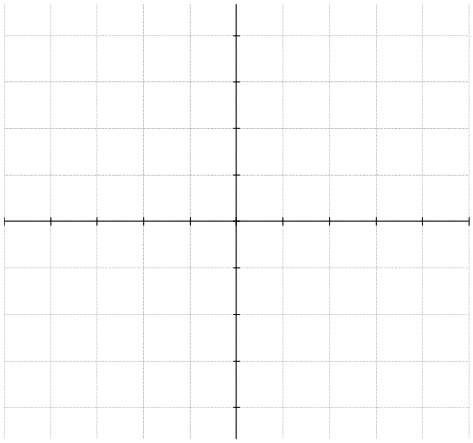
Continuity of Polynomial and Rational Functions: Let *P(x)* and *Q(x)* be polynomials.

Continuity of some basic function:

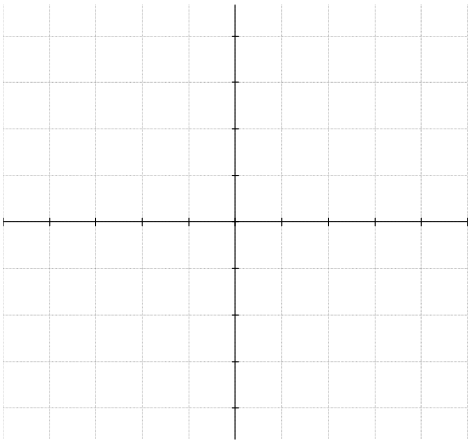
$y = x^{\frac{1}{n}}$



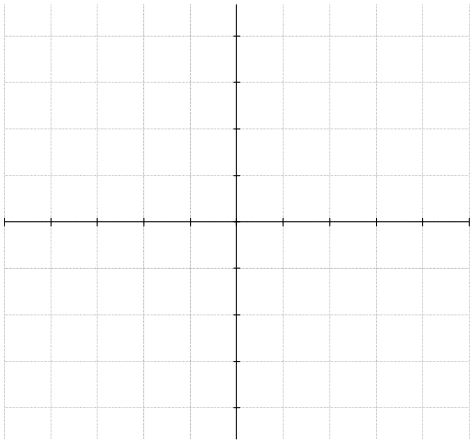
$y = \sin x$ $y = \cos x$



$y = b^x$



$y = \log_b x$



Continuity of Composite Funcions: If *g* is continuious at *x=c*, and if f is continuous at *x=g(c)*, then

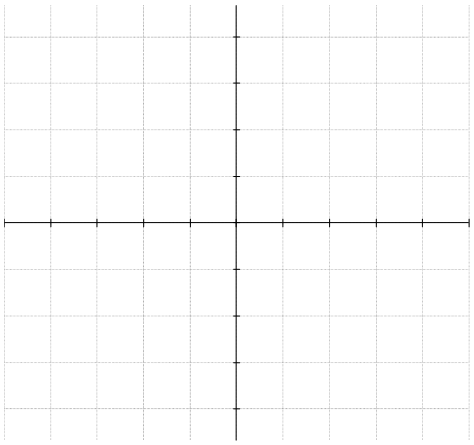
Substitution method for evaluating limits:

$$\lim_{x \to c} f(x) = f(c)$$

When

3. Evaluate $\lim_{x \to -1} \frac{2^x}{\sqrt{x+5}}$ if possible

4. Evaluate $\lim_{x \to 1} [\![x]\!]$ if possible. $[\![x]\!]$= greatest integer funcion



AP Calculus