CALCULUS 12

THE SANDWICH THEOREM

The Police Theorem or The Pinching theorem

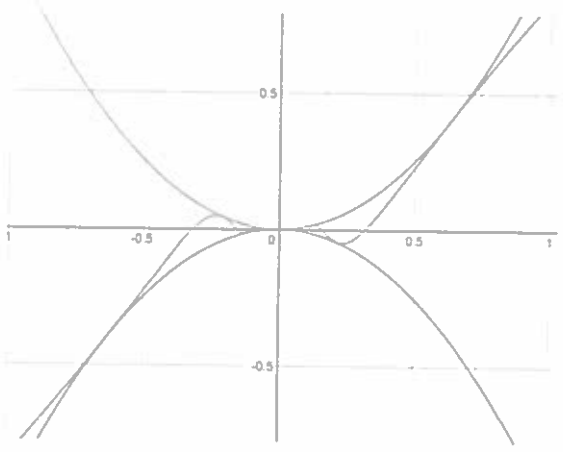
If $g(x) \leq f(x) \leq h(x)$ for all $x \neq c$ in some interval about c, and

$$\lim_{x \to c} g(x) = \lim_{x \to c} h(x) = L,$$

then

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

Example: Using the Sandwich Theorem, show that $\lim_{x \to 0}[x^2 \sin\left(\frac{1}{x}\right)] = 0$.



Important Graphs

$f(x) = xsin(x)$	$f(x) = xcos(x)$
$f(x) = \sin\left(\frac{1}{x}\right)$	$f(x) = cos\left(\frac{1}{x}\right)$
$f(x) = \frac{1}{x^2}$	$f(x) = \frac{sinx}{x}$
$f(x) = \frac{cosx}{x}$	$f(x) = \frac{x}{\|x\|}$

Example 2: Using the Sandwich Theorem and properties of trinagles find the limit of $\lim_{x\to 0} \frac{sinx}{x}$