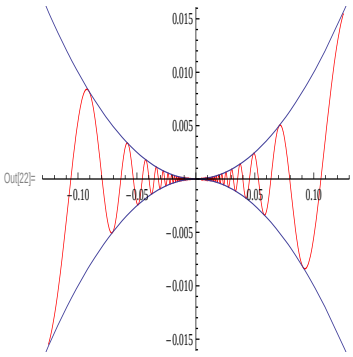
Also observe this relation in the graph below:



We know that $\lim_{x\to 0} -x^2 = \lim_{x\to 0} x^2 = 0$. Taking $f(x) = -x^2$, $g(x) = x^2 \sin(\frac{1}{x})$ and $h(x) = x^2$ in the Squeeze Theorem, we obtain $\lim_{x\to 0} x^2 \sin(\frac{1}{x}) = 0$

Little Exercise Try yourself to show $\lim_{x\to 0} x \sin(1/x) = 0$. Here you will need your directional limit abilities along with the Squeeze Theorem.