$with(plots):$

Section 1.2 #22 WebAssign (Just-in-Time #6)

$p := x \rightarrow x^2 - 0.012 \cdot x - 0.065$

$$p := x \mapsto x^2 + (-1)\, 0.012\, x - 0.065 \qquad \textbf{(1)}$$

$solve(p(x) = 0)$

$$0.2610215677,\ -0.2490215677 \qquad \textbf{(2)}$$

$\sqrt{260144}$

$$4\sqrt{16259} \qquad \textbf{(3)}$$

$evalf(\mathrm{sqrt}(16259))$

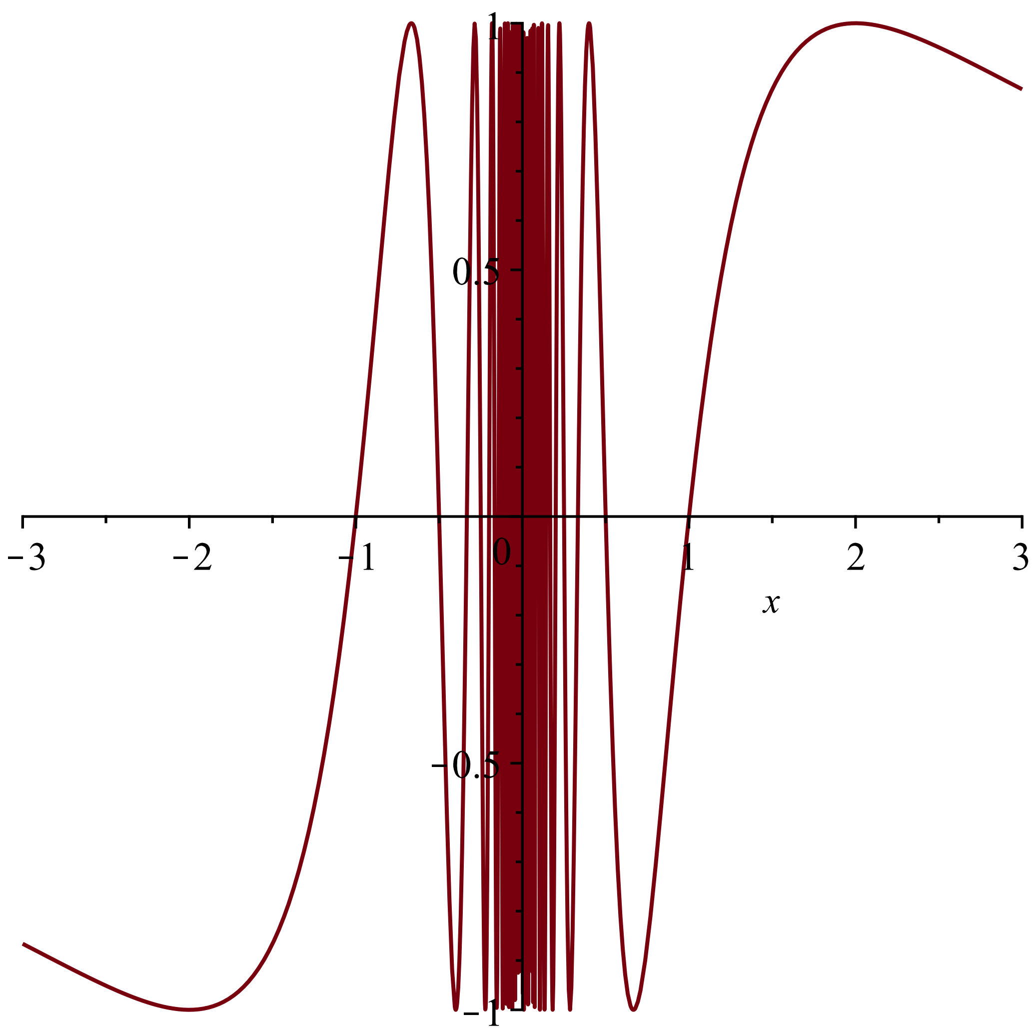
$$127.5107839 \qquad \textbf{(4)}$$

Section 1.5 #18 - Important example, related to "topologist's sine curve," which is one of the key functions for illustrating some of the subtleties of limits, continuity, and differentiability.

$f := x \rightarrow \sin\left(\frac{\mathrm{Pi}}{x}\right)$

$$f := x \mapsto \sin\left(\frac{\pi}{x}\right) \qquad \textbf{(5)}$$

$plot(f(x), x = -3..3)$

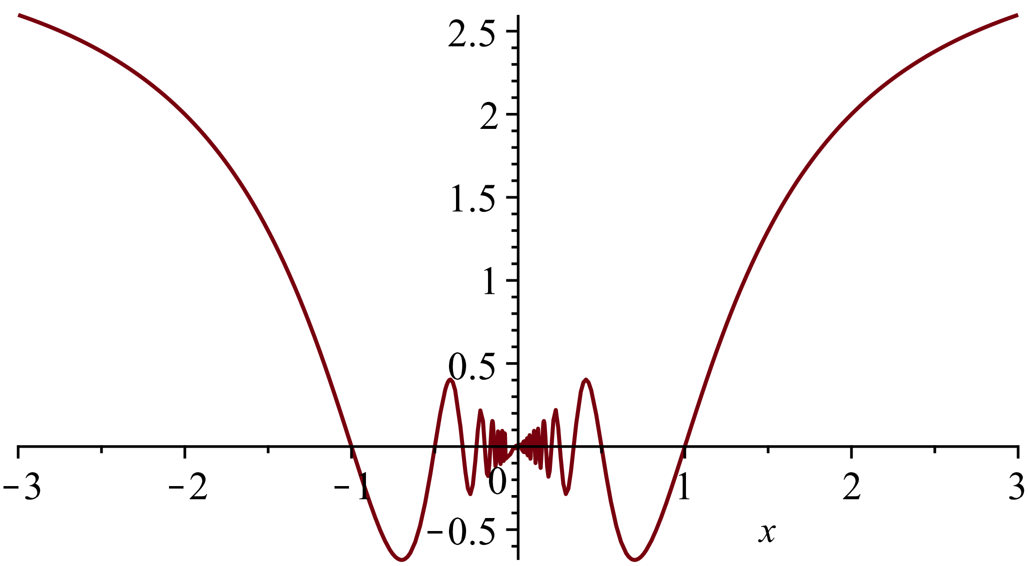


Damped curve has a limit of zero at $x = 0$. It can be made continuous by defining it to be zero at $x = 0$.

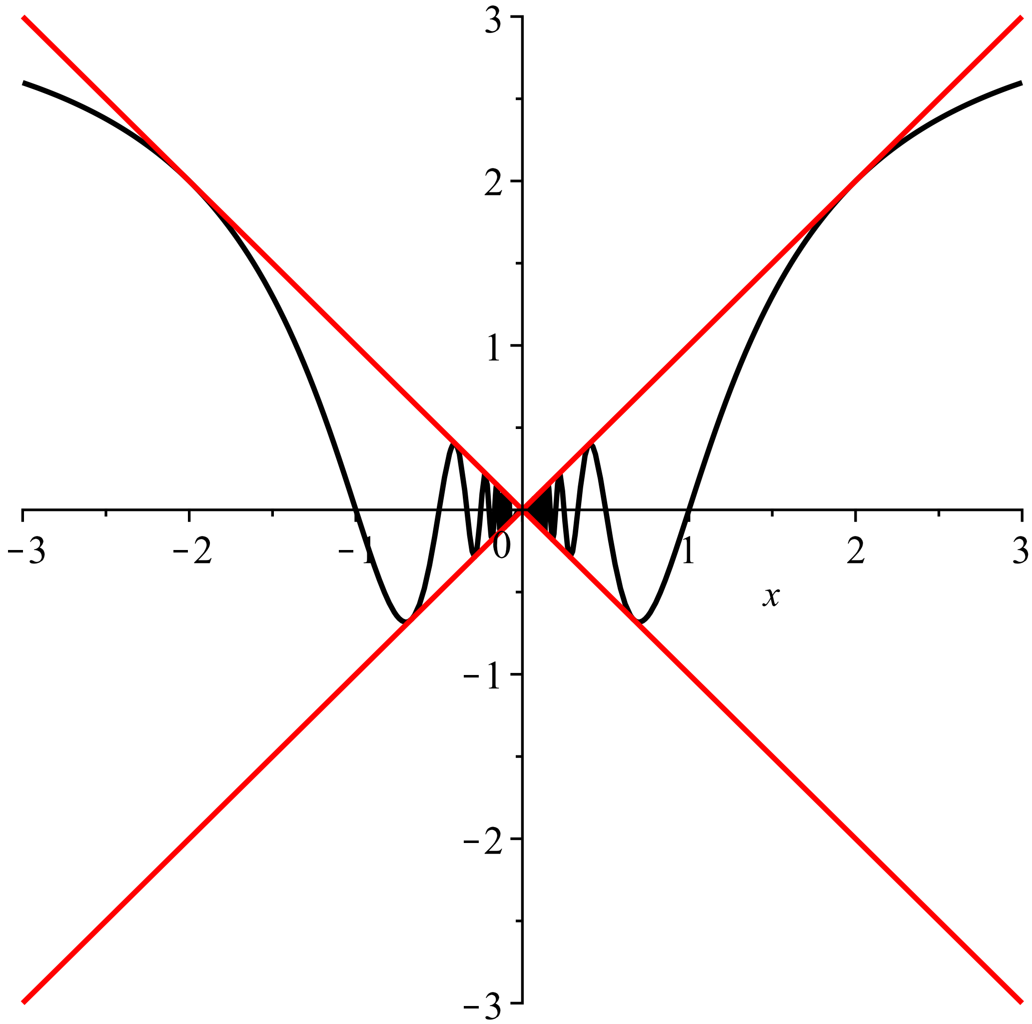
$g := x \rightarrow x \cdot \sin\left(\frac{\text{Pi}}{x}\right)$

$$g := x \mapsto x \sin\left(\frac{\pi}{x}\right) \tag{6}$$

$plot(g(x), x = -3..3)$



$plot([g(x), x, -x], x = -3..3, color = [black, red, red], thickness = 2)$

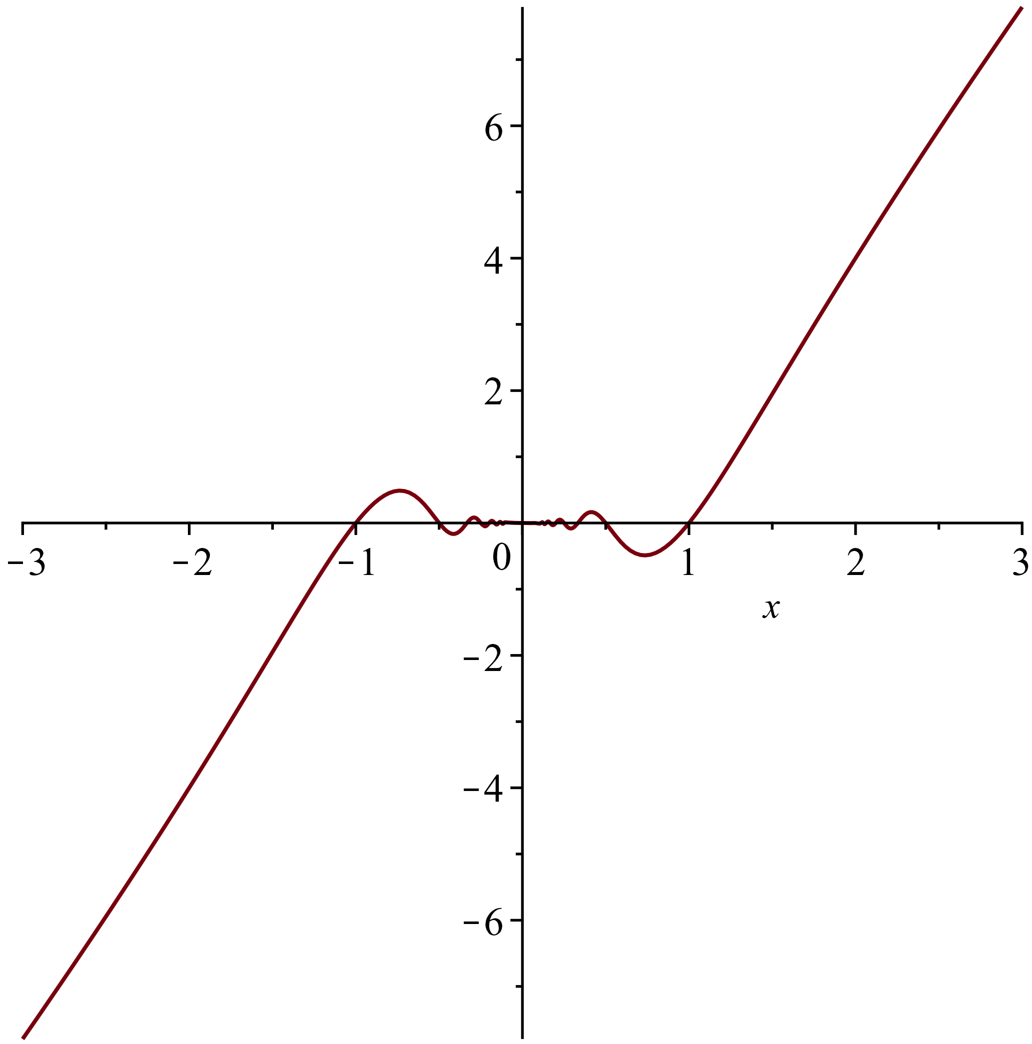


Another damped sine curve. This one is nice, because you can make it differentiable, because of the damping.

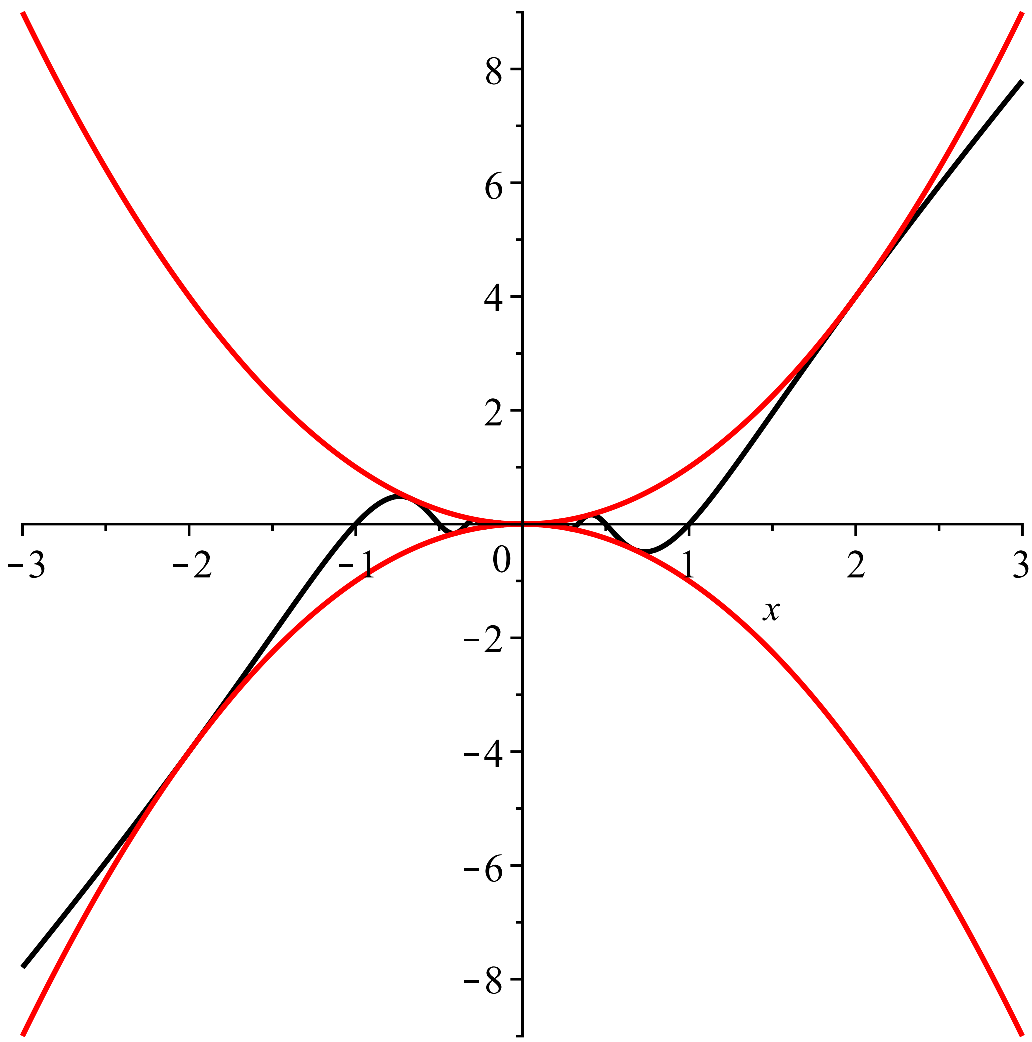
$h := x \rightarrow x^2 \cdot \sin\left(\frac{\text{Pi}}{x}\right)$

$$h := x \mapsto x^2 \sin\left(\frac{\pi}{x}\right) \quad \textbf{(7)}$$

$plot(h(x), x = -3..3)$



$plot([h(x), x^2, -x^2], x = -3..3, color = [black, red, red], thickness = 2)$



8
6
4
2
−2
−4
−6
−8
−3
−2
−1
0
1
2
3
x

>