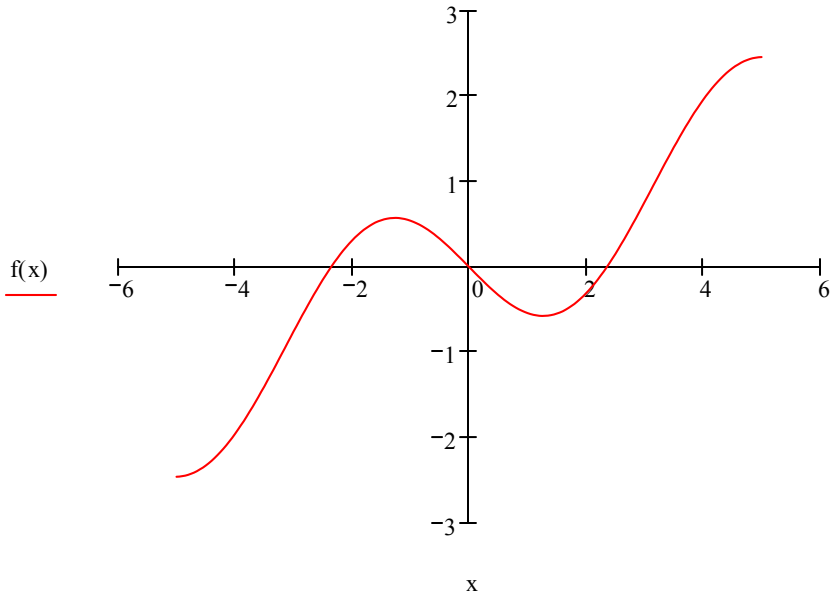
# Root Function Example

$$f(x) := .3 \cdot x - \sin(x)$$

$$x := -5, -4.95 .. 5$$




format graph for "crossed" instead of "boxed" Axis Style

approximate roots (using Trace feature): -2.4, 0, 2.4

Finding roots over a range of initial guesses:

$$x := -3, -2.75 .. 3$$

| x = | root(f(x), x) = |
|---|---|
| -3 | -2.357 |
| -2.75 | -2.356 |
| -2.5 | -2.357 |
| -2.25 | -2.356 |
| -2 | -2.356 |
| -1.75 | -2.357 |
| -1.5 | -2.356 |

| | |
|---|---|
| -1.25 | 2.357 |
| -1 | $5.006 \cdot 10^{-5}$ |
| -0.75 | $5.502 \cdot 10^{-4}$ |
| -0.5 | $4.204 \cdot 10^{-6}$ |
| -0.25 | $-1.13 \cdot 10^{-4}$ |
| 0 | 0 |
| 0.25 | $1.13 \cdot 10^{-4}$ |
| 0.5 | $-4.204 \cdot 10^{-6}$ |
| 0.75 | $-5.502 \cdot 10^{-4}$ |
| 1 | $-5.006 \cdot 10^{-5}$ |
| 1.25 | -2.357 |
| 1.5 | 2.356 |
| 1.75 | 2.357 |
| 2 | 2.356 |
| 2.25 | 2.356 |
| 2.5 | 2.357 |
| 2.75 | 2.356 |
| 3 | 2.357 |

$x := 1.25$ $\quad root(f(x), x) = -2.357$

$x := -1.25$ $\quad root(f(x), x) = 2.357$

note - the nearest root was not found in these cases

$x := 1.2661$ $\quad root(f(x), x) = -5.88 \times 10^{-4}$

Newton-Raphson Method or plain Secant Method would have trouble with this initial guess since the derivative is close to zero

function: $.3 \cdot x - \sin(x)$

derivative root: $.3 - \cos(x) = 0$

$x = 1.2661036727794991113$