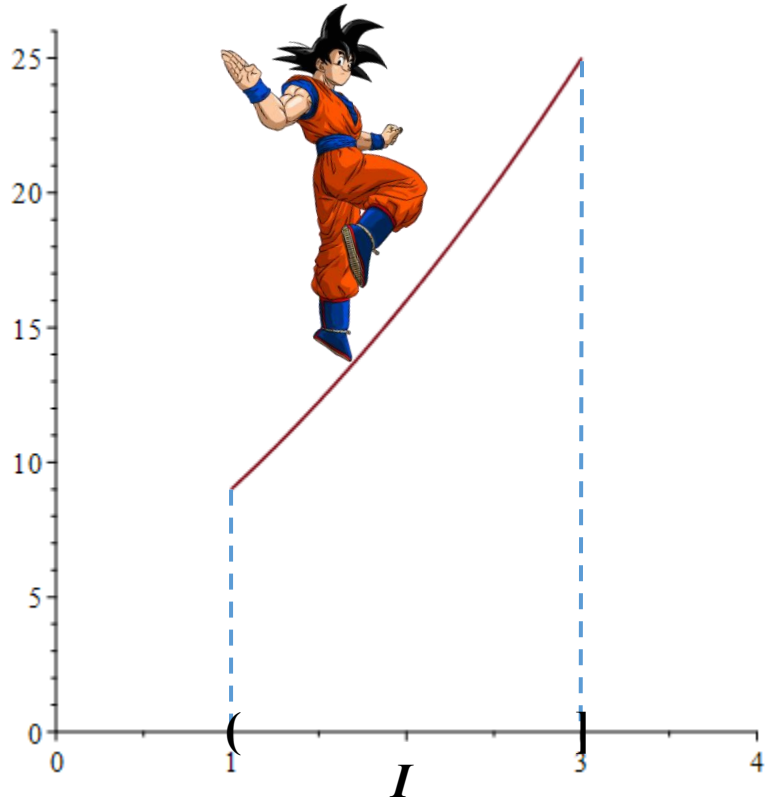
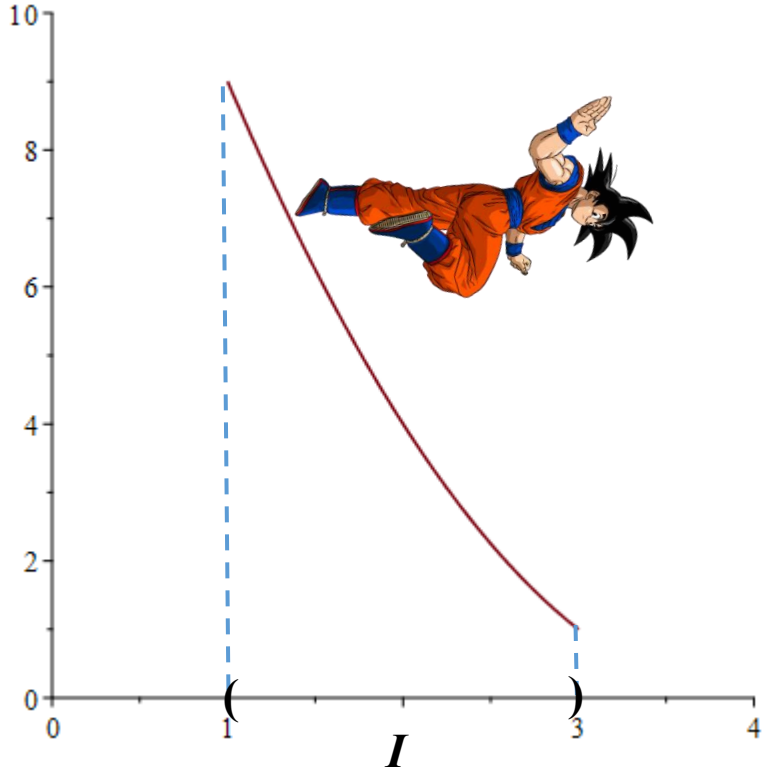
Increasing, Decreasing, and Constant:

A function *f* is increasing on an interval *I*, if for x, y in *I* with $x < y$, then $f(x) < f(y)$.



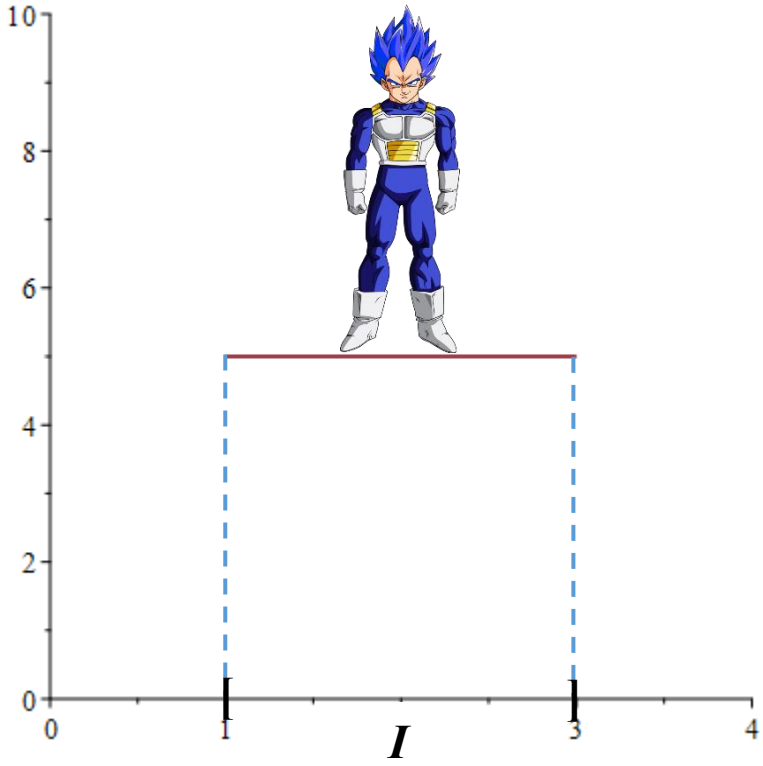
Moving up from left to right!

A function *f* is decreasing on an interval *I*, if for x, y in *I* with $x < y$, then $f(x) > f(y)$.

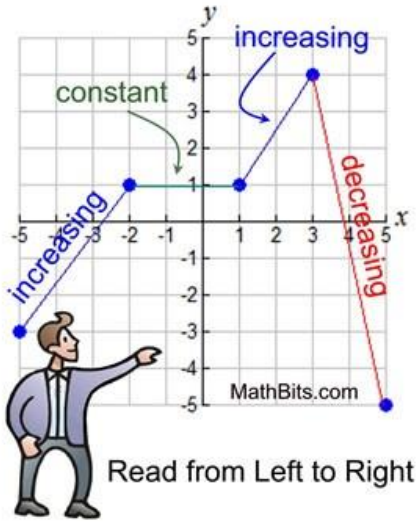


Moving down from left to right!

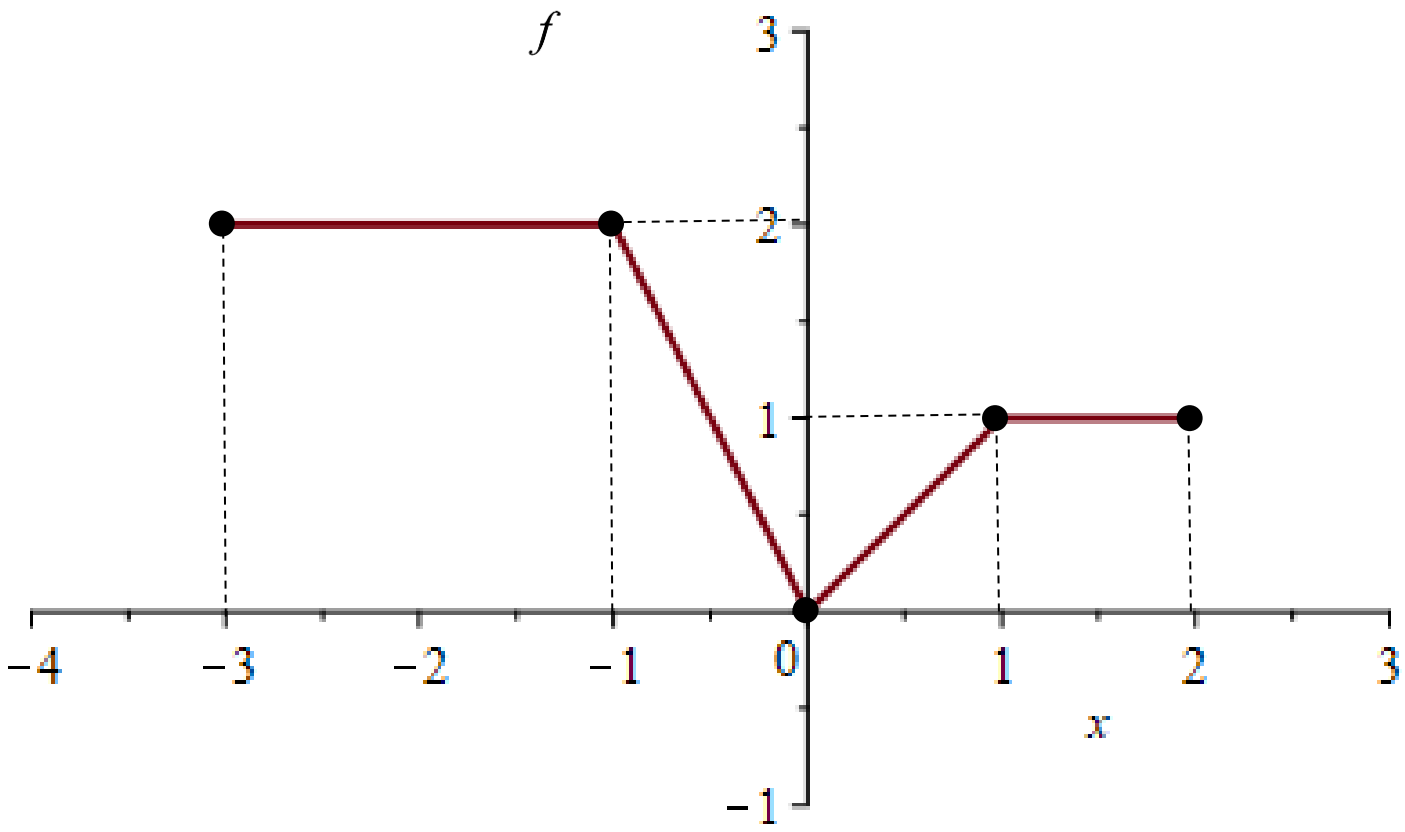
A function *f* is constant on an interval *I*, if for x, y in *I*, then $f(x) = f(y)$.



Level ground!

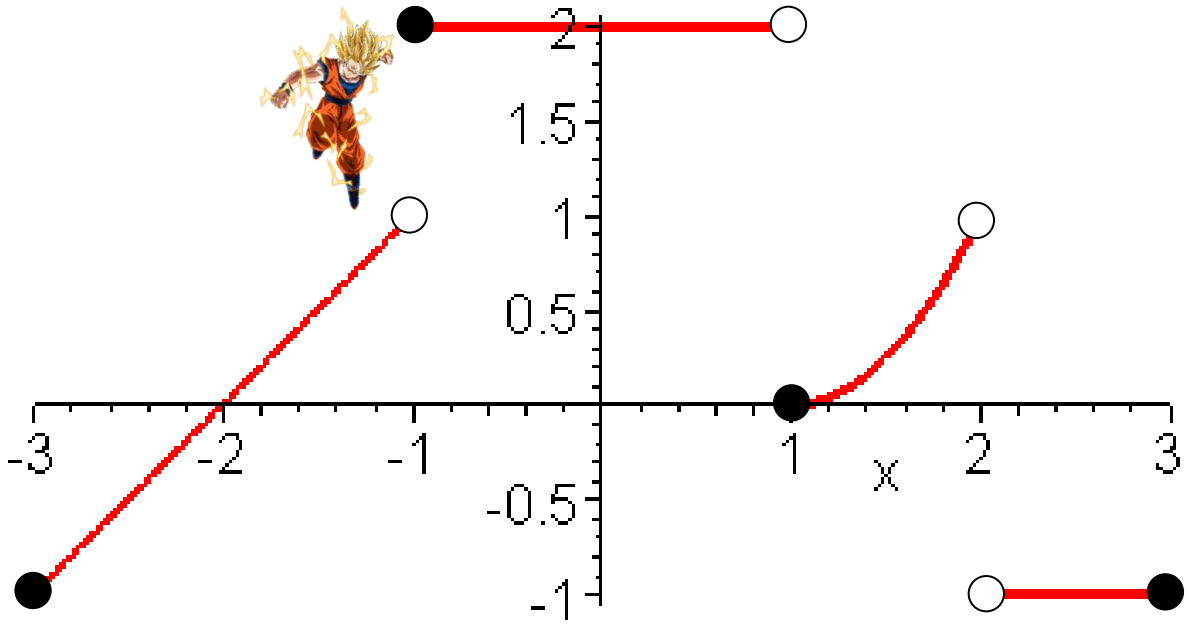


Determine the intervals where *f* is increasing, decreasing, and constant.



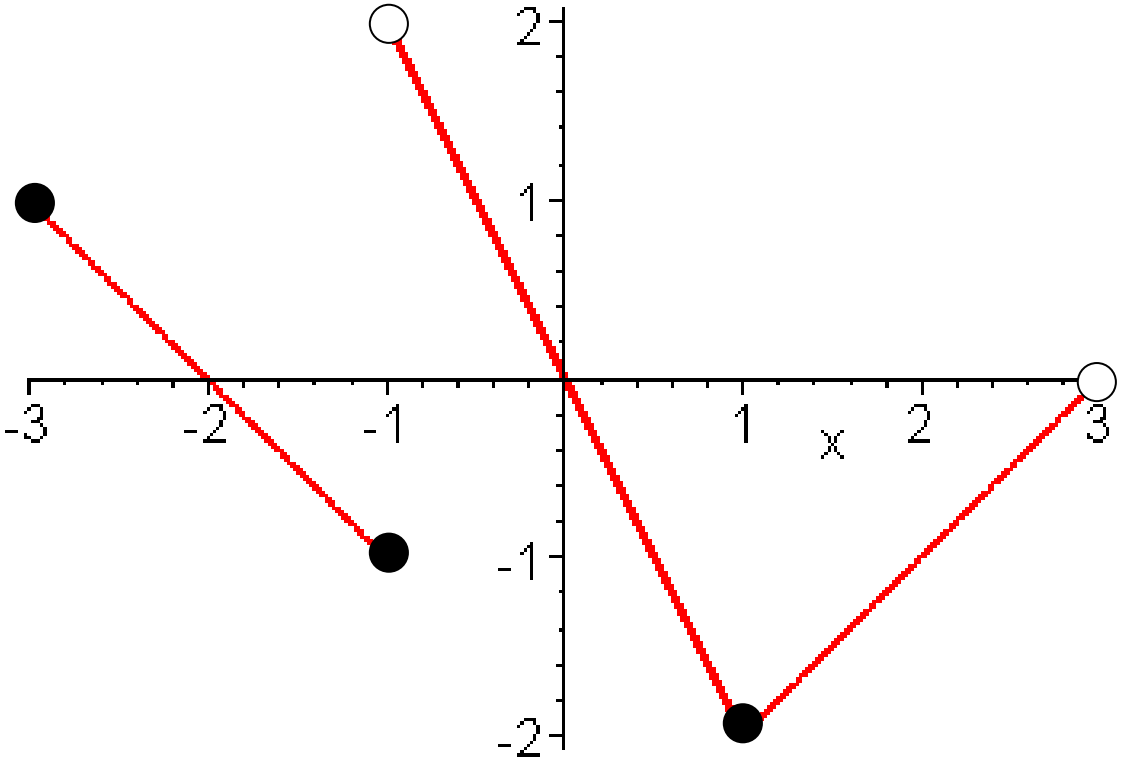
Determine the intervals where *g* is increasing, decreasing, and constant.

g



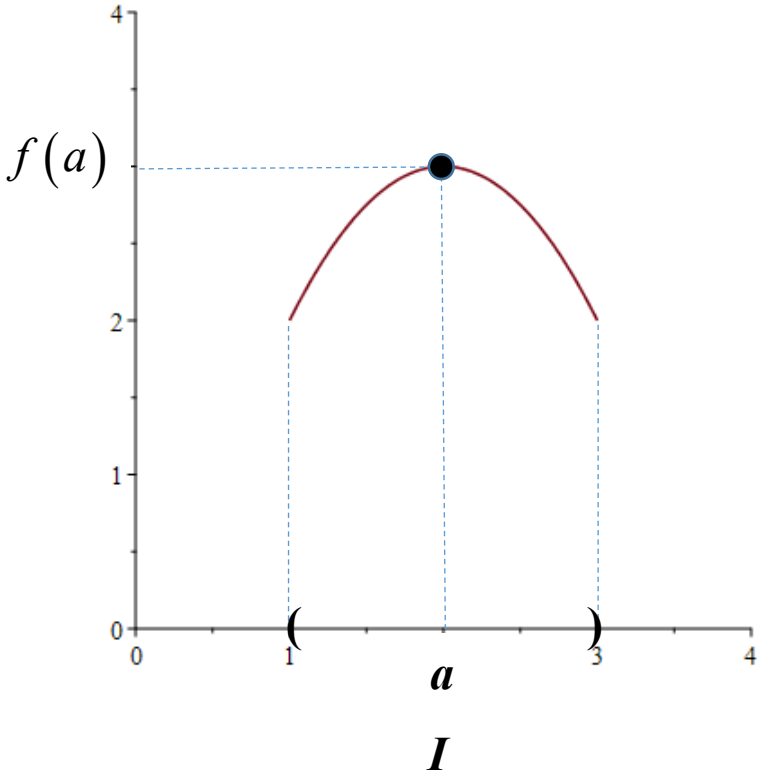
Determine the intervals where *h* is increasing, decreasing, and constant.

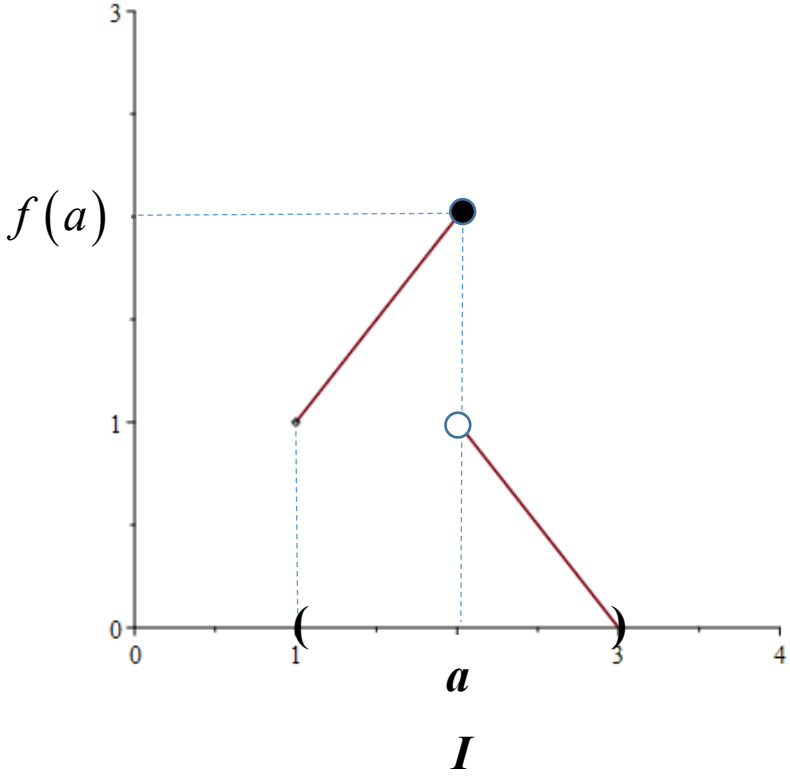
h



Local (or Relative)Extrema:

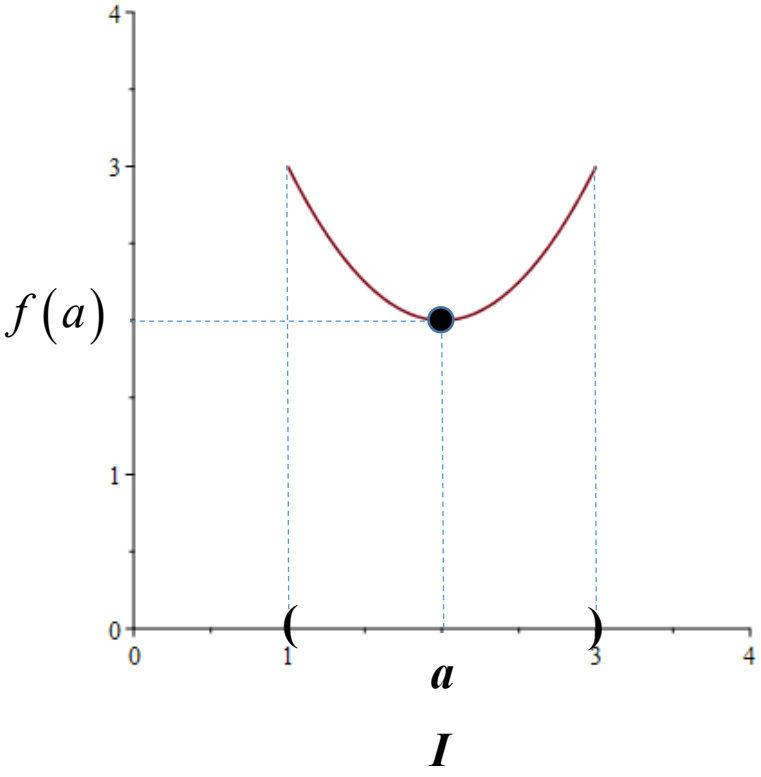
A function *f* has a local(or relative) maximum at *a*, if there is an open interval *I* containing *a* with $f(x) < f(a)$ for all *x* in *I* with $x \neq a$.

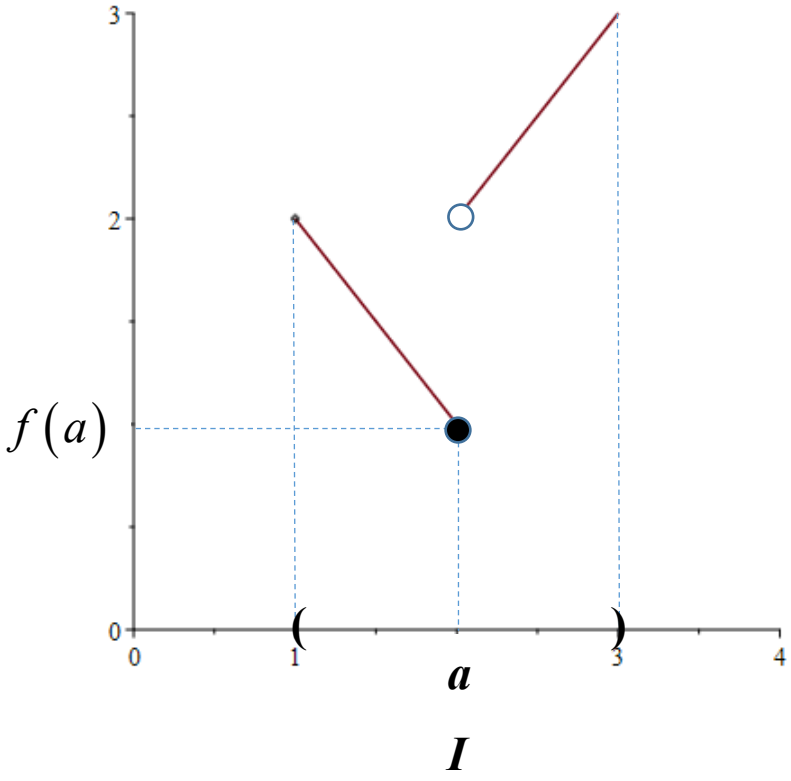




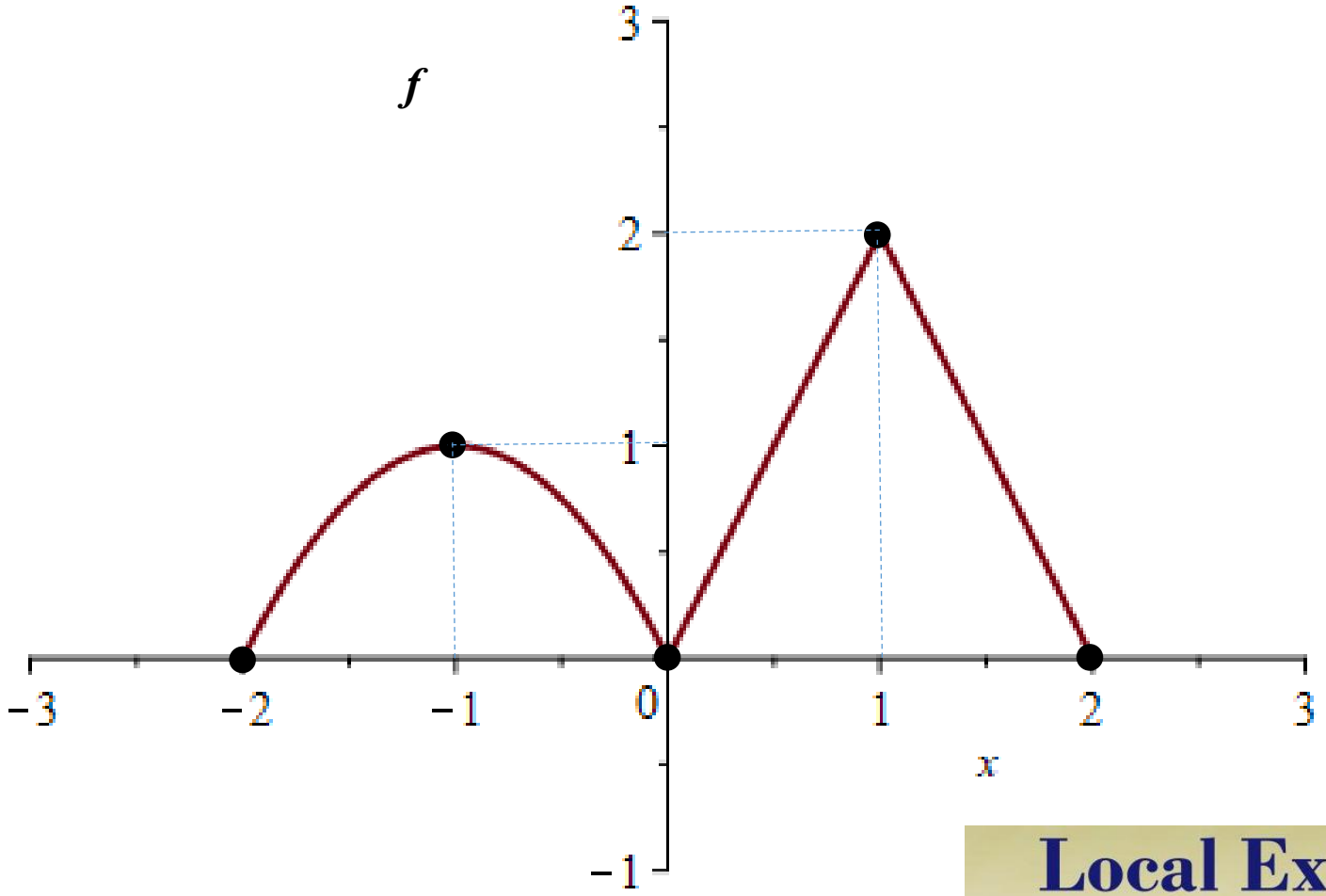
A local maximum corresponds to a high spot in the graph of the function!

A function *f* has a local minimum at *a*, if there is an open interval *I* containing *a* with $f(x) > f(a)$ for all *x* in *I* with $x \neq a$.

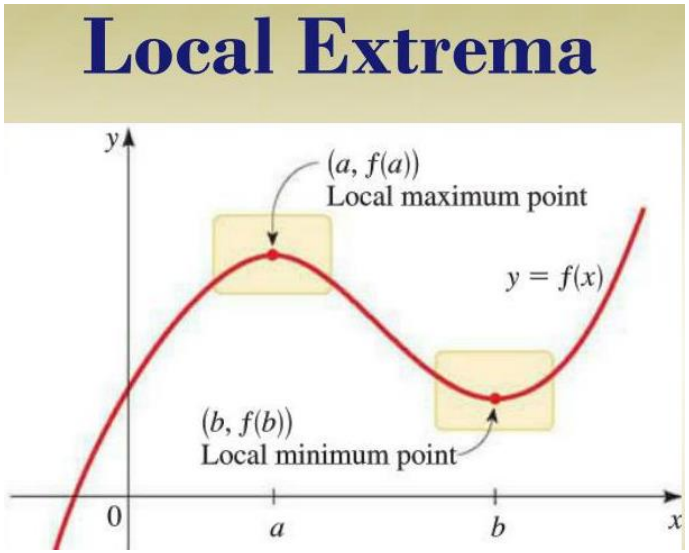


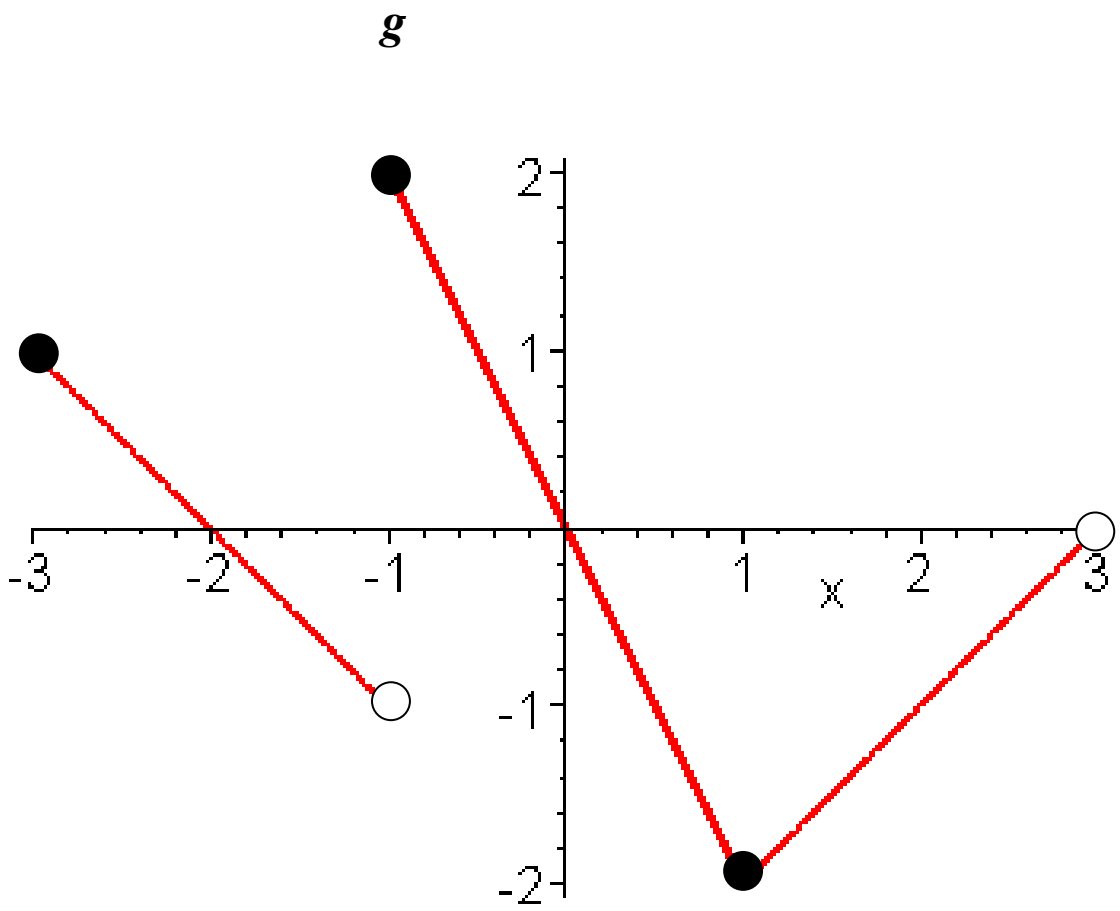


A local minimum corresponds to a low spot in the graph of the function!



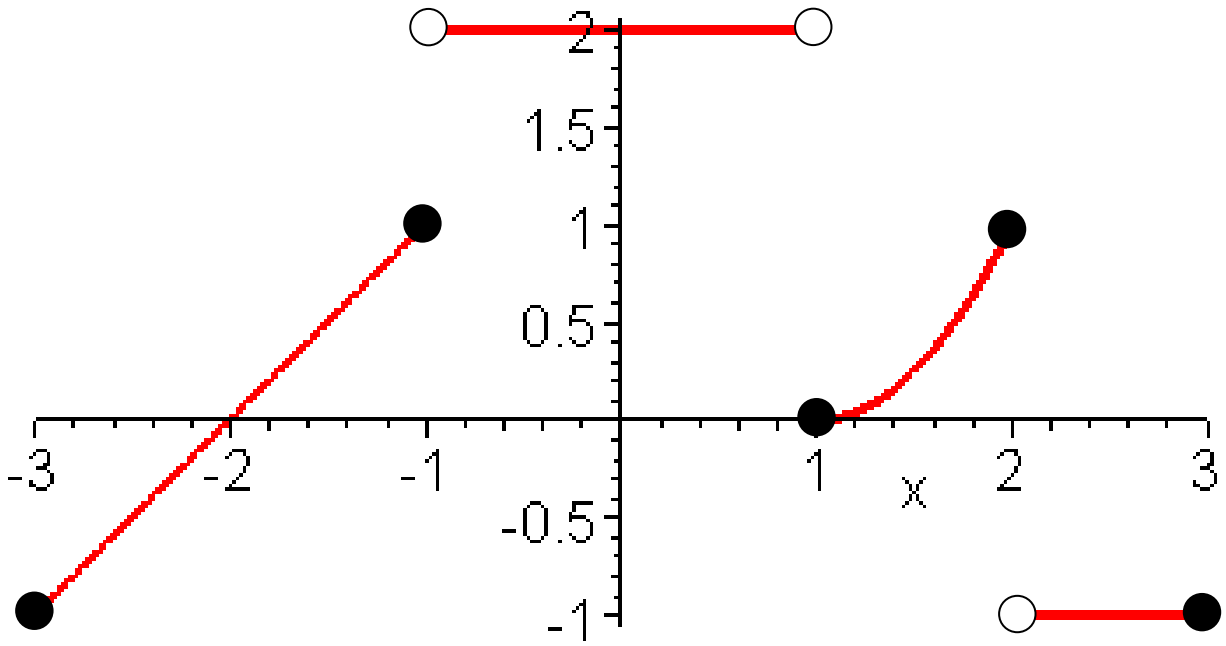
Find all the local extrema of the function *f*.



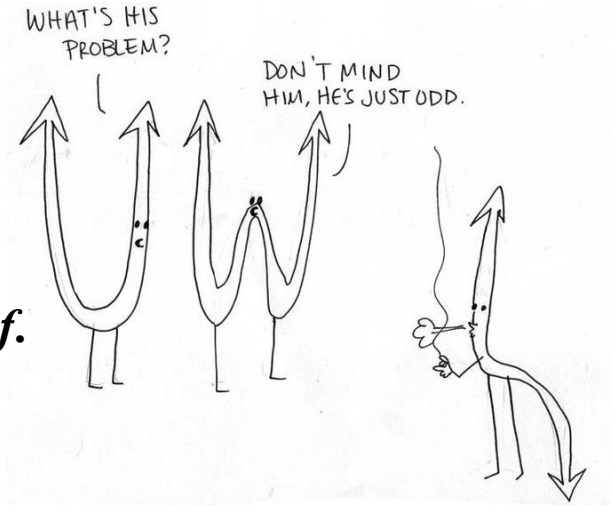


Find all the local extrema of the function *g*.

h

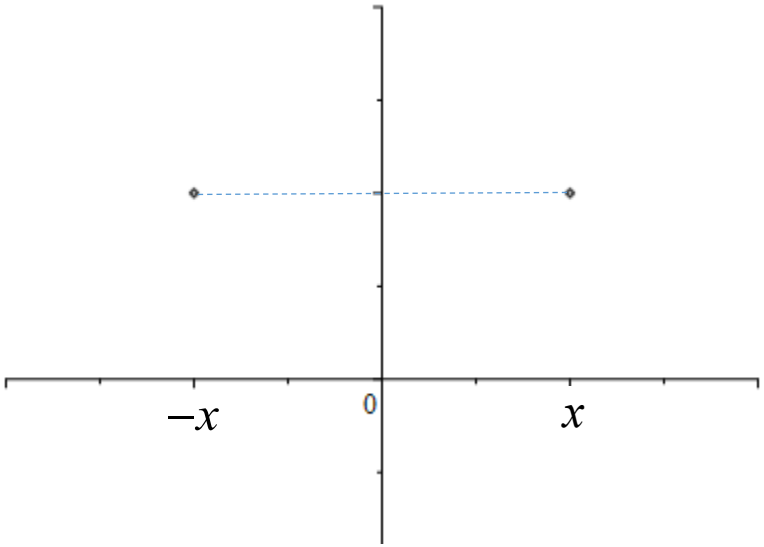


Find all the local extrema of the function *h*.



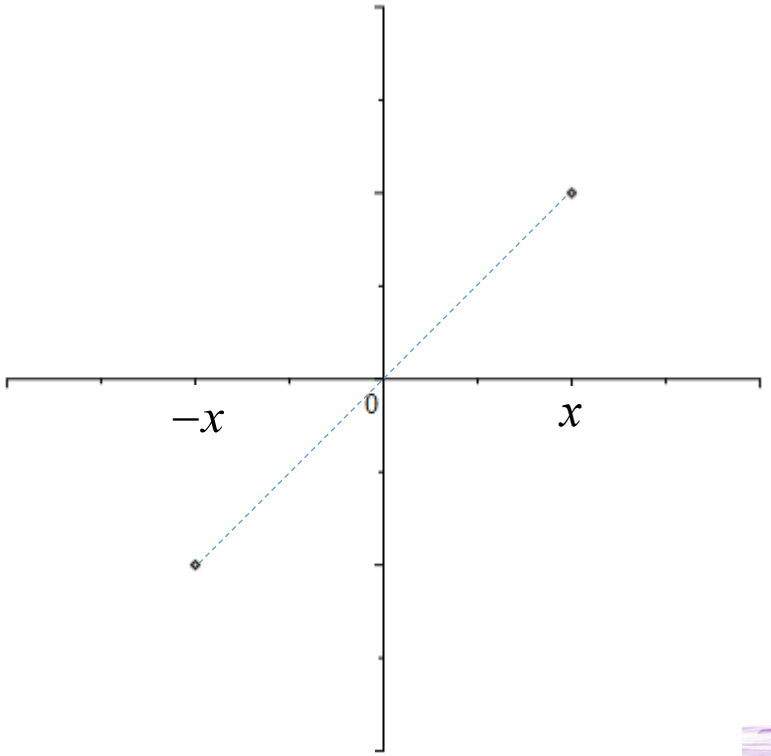
Even and Odd Functions:

A function *f* is even if $f(-x) = f(x)$ for all *x* in the domain of *f*.

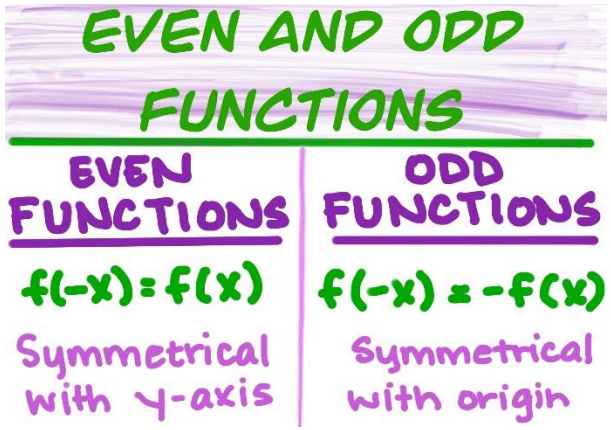


The graph has *y*-axis symmetry.

A function *f* is odd if $f(-x) = -f(x)$ for all *x* in the domain of *f*.

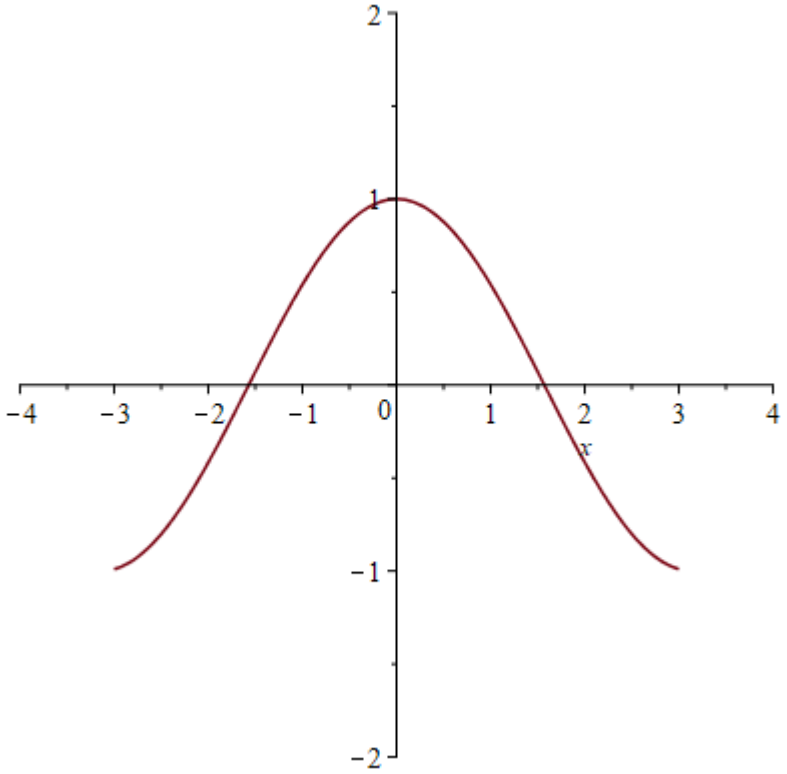


The graph has origin symmetry.

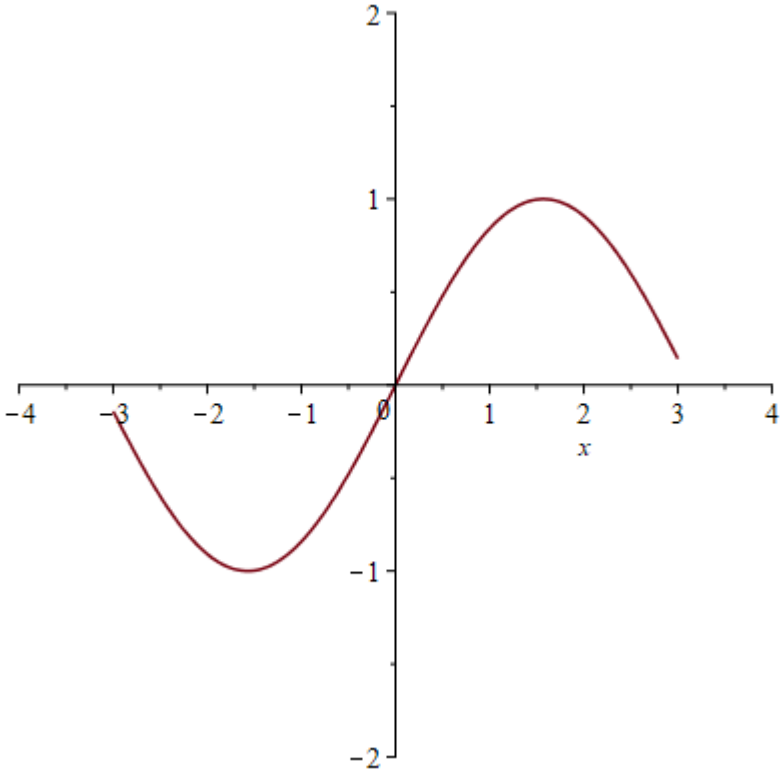


Determine if the following functions are odd, even, neither, or both.

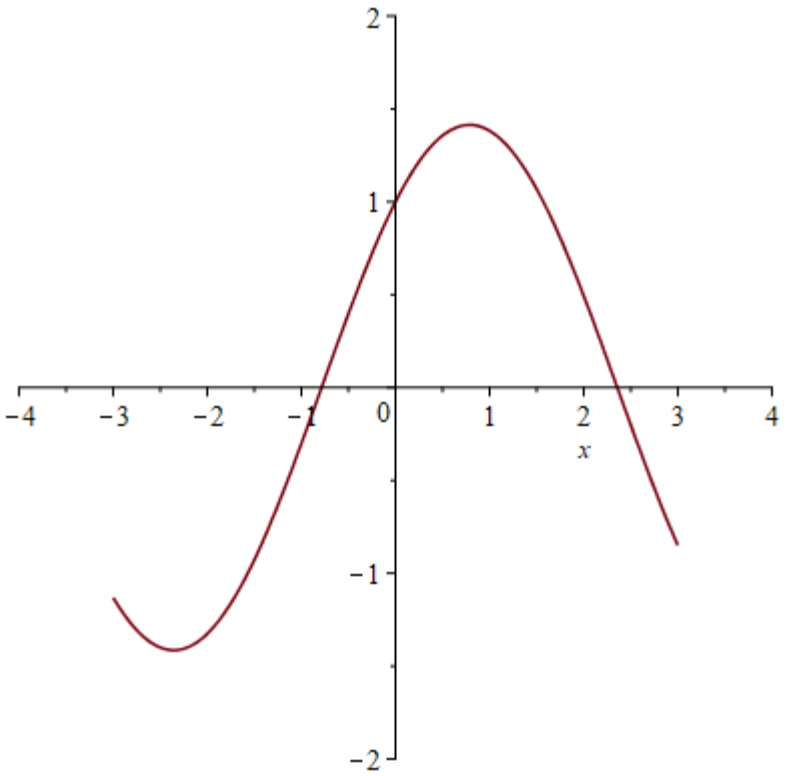
1.



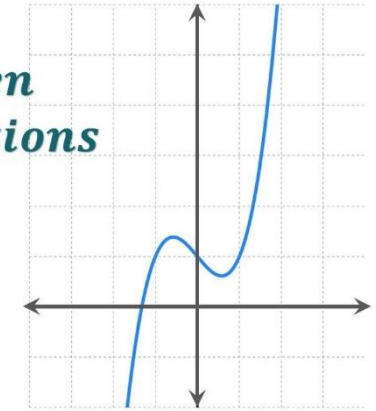
2.



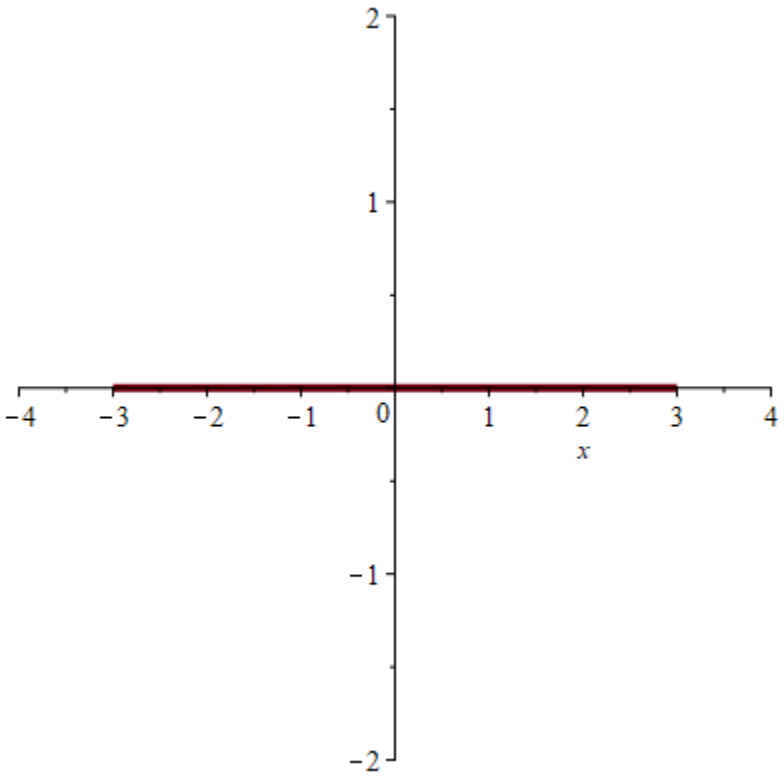
3.



Neither Even nor Odd Functions



4.



5. $f\left(x\right)=2x^4-x^2$

6. $f\left(x\right)=x^3+x$

7. $f\left(x\right)=x+x^{2}$

8. $f\left(x\right)=\left(x+1\right)^{2}-\left(x-1\right)^{2}-4x$

9. $f(x)=\begin{cases} x^3 \ ; x \geq 0 \\ -x^3 ; x \leq 0 \end{cases}$