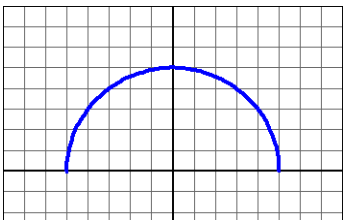
Calculus 130, section 6.1 Absolute Maximum

notes by Tim Pilachowski

Section 6.1 is a more in-depth look at something already encountered: absolute maximum.

5.1-5.2 Example C revisited: The function $f(x)=\sqrt{25-x^2}$ has a limited domain, [–5, 5], and range, [0, 5].



interval(s) increasing:

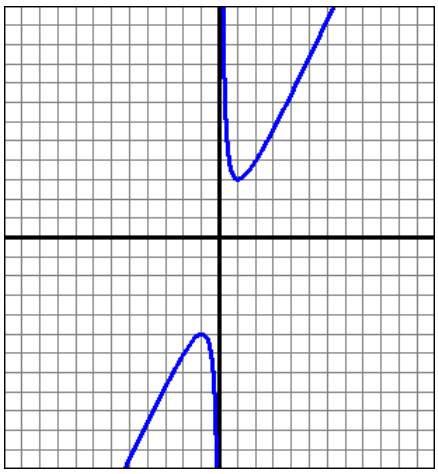
interval(s) decreasing:

extrema (maximum or minimum):

maximum value of the function:

minimum value of the function:

5.1-5.2 Example E revisited: $f(x)=2x+\frac{2}{x}-1=2x+2x^{-1}-1$.



interval(s) increasing:

interval(s) decreasing:

extrema (maximum or minimum):

maximum value of the function:

minimum value of the function:

5.1-5.2 Example F revisited: $f(x)=\frac{x^3}{e^x}$.

interval(s) increasing:

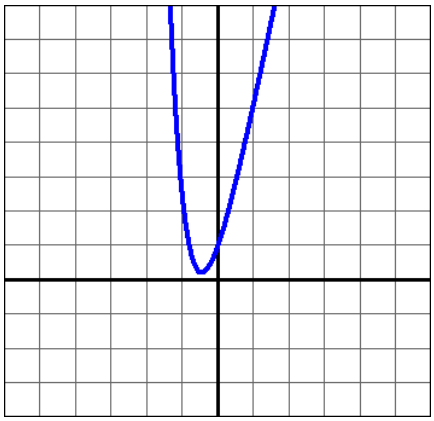
interval(s) decreasing:

extrema (maximum or minimum):

maximum value of the function:

minimum value of the function:

5.4 Example E revisited: $f(x)=5x+e^{-2x}$.



interval(s) increasing:

interval(s) decreasing:

extrema (maximum or minimum):

maximum value of the function:

minimum value of the function:

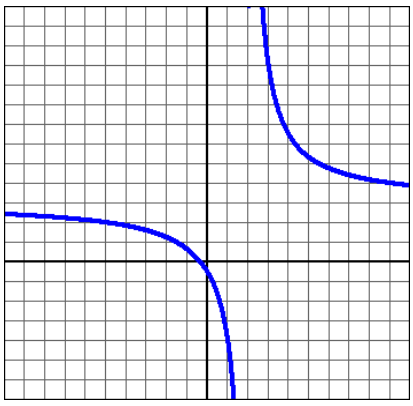
6.1 Example A: Determine the domain of $f(x)=\dfrac{x-1}{x^2+1}-$ and whether the function has an absolute minimum or maximum on its domain.

5.4 Example A revisited: $f(x)=x^3-3x^2-9x+1$.

Extreme Value Theorem: A function which is continuous on a closed interval [*a*, *b*] will have both an absolute maximum and an absolute minimum on the interval.

6.1 Example B: Determine whether the function $f(x)=\dfrac{1}{4}x^4-\dfrac{1}{3}x^3-3x^2$ has an absolute minimum or maximum on the closed interval [−3, 3].

5.1-5.2 Example D revisited: $f(x)=\dfrac{3x+1}{x-2}$.



6.1 Example C: Example B: Public health officials use rates of change to quantify the spread of an epidemic into an equation, which they then use to determine the most effective measures to counter it. A recent measles epidemic followed the equation $y = 45t^2 - t^3$ where y = the number of people infected and t = time in days.

a) What is the domain of this function? *Answer*: $0 \le t \le 45$ days

b) How many people are infected after 5 days? *Answer*: 1000 people

c) What is the rate of spread after 5 days? *Answer*: 375 new cases per day

d) After how many days does the number of cases reach its maximum? *Answer*: 30 days

e) Use the above to sketch the graph of y.