4.5 Curve Sketching

Math 1271, TA: Amy DeCelles

1. Overview

In this section, we put together all that we know about graphs from algebra, precalculus, and calculus to sketch graphs of functions. When graphing a function ask yourself the following seven questions:

1. **Domain** What is the domain of the function? Are there any numbers for which $f(x)$ is undefined?
2. **Intercepts** What are the x- and y-intercepts?

   To find the x-intercept, set $y = f(x)$ equal to zero and solve for x.

   To find the y-intercept, plug in $x = 0$.
3. **Symmetry** Is the function even? odd? periodic?

   Even: symmetric across the y-axis: $f(-x) = f(x)$ for all x

   Odd: symmetric about the origin: $f(-x) = -f(x)$ for all x

   Periodic: The function repeats (like $\sin x$, $\cos x$, etc.)
4. **Asymptotes** What are the horizontal and vertical asymptotes? Slant asymptotes?
5. **Intervals of increase and decrease** Where is $f(x)$ increasing/decreasing? (Look at the first derivative!)
6. **Local maxima and minima** Are there any local max/mins? What are the local max/min values?
7. **Concavity and Inflection Points** Where is $f(x)$ concave up/down? Are there any points (x, y) on the graph where f switches concavity? (Look at the second derivative.)