Extrema

While working in a group make sure you:

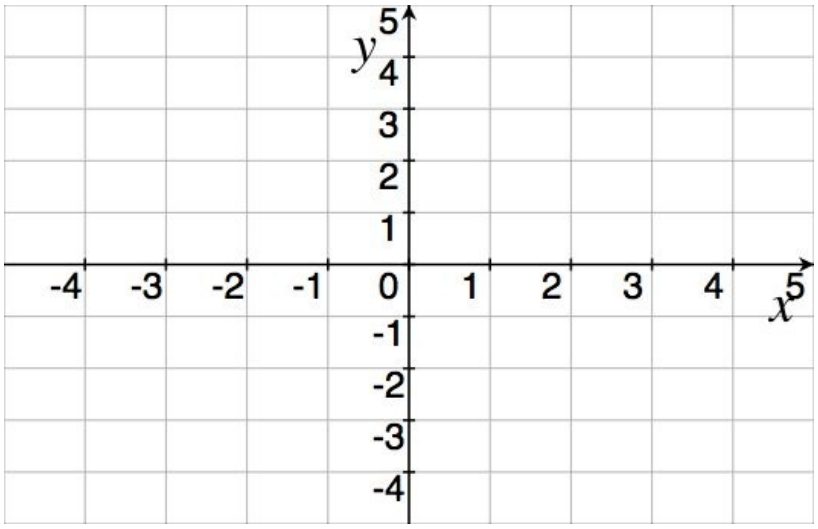
- Expect to make mistakes but be sure to reflect/learn from them!
- Are civil and are aware of your impact on others.
- Assume and engage with the strongest argument while assuming best intent.

Definition 0.1. Let c be a number in the domain D of a function f. Then $f(c)$ is the

1. *absolute maximum* value of f on D if $f(x) \leq f(c)$ for all x in D.
2. *absolute minimum* value of f on D if $f(c) \leq f(x)$ for all x in D.
3. *local maximum* value of f if $f(x) \leq f(c)$ for all x near c.
4. *local minimum* value of f if $f(c) \leq f(x)$ for all x near c.

1. Draw graphs of two functions f and g so that:

   (a) f is continuous on $[0, 5)$
   (b) f has a local max when $x = 3$
   (c) $f'(3) = 0$
   (d) g is continuous on $(-5, 0]$
   (e) g has a local max when $x = -3$
   (f) $g'(-3)$ is not defined.



2. Consider $m(x) = x^3 - 9x^2 - 48x - 5$.

   (a) Find the critical points of m.

   (b) Find all relative extrema and their values using the first derivative method.

3. Use calculus to find all the relative extrema of $g(x) = \sin^2(x) + \sin(x)$ on the interval $[0, 2\pi]$.