Goal: Practice the difference between finding local extreme points, finding absolute extreme points on a closed interval, and finding absolute extreme points on an open interval. Review:

- To find local extreme points using the first derivative test, first find the critical points (where $f'(x) = 0$ or $f'(x)$ DNE), then use these as the "break points" in a sign chart. At each critical point, determine if the sign of the first derivative changes to see if there is a local max there, a local min there, or neither.

  Alternately, you can try the second derivative test: if the second derivative is negative at the critical point, the function has a local maximum there, if the second derivative is positive at the critical point, the function has a local minimum there, and if the second derivative is zero, the test is inconclusive.

- To find absolute extreme points on a closed interval, first find the critical points. Then substitute the critical points and the endpoints of the interval into the function, choosing the largest and smallest y-values.

- To find absolute extreme points on an open interval, start by finding all critical points. Hope that there is only one critical point. If so, determine if it is a local minimum or maximum (see above). Since there is only one critical point, if the function has a local min or local max there, it is also an absolute min or absolute max.

1. Find all local max/local min values of $f(x) = x^2 - 6x - 1$

2. Find the absolute max/absolute min values of $f(x) = x^2 - 6x - 1$ on the interval $[-1, 4]$

3. Find the absolute max/absolute min values (if they exist) of $f(x) = x^2 - 6x - 1$ on the interval $(-\infty, \infty)$.