Examples 7.3 – Graph Analysis with the TI-84

We demonstrate each of the first six choices in the "calculate" menu and postpone definite integration until Chapter 8. Follow along with your own calculator.

Consider the functions $f(x) = (x-2)^3 - 5x + 12$ and $g(x) = 3x - 2$ for x in the interval [0, 5]. In the function menu, we enter `\Y1=(X-2)^3-5X+12` and `\Y2=3X-2`, and we set the viewing window as [0, 5] × [–6, 7].

`1:` Suppose we want $f(1)$ and $g(1)$. Choose `1:value`, input x = 1, and press **[ENTER]**. Toggle between `Y1` and `Y2` with the up and down arrow keys.

`2:` Note that f has an x-intercept between x = 2 and x = 3. To find it, choose `2:zero`, and toggle to `Y1`. Using the arrow keys, position the cursor slightly to the left of the intercept and press **[ENTER]**. Then position the cursor slightly to the right of the intercept and press **[ENTER]**. Finally, position the cursor between the chosen bounds, near the intercept, and press **[ENTER]**.

`3:` A local minimum of f occurs between x = 3 and x = 4. Choose `3:minimum`, and toggle to `Y1`. Using the arrow keys, position the cursor slightly to the left of the minimum and press **[ENTER]**. Then position the cursor slightly to the right of the minimum and press **[ENTER]**. Finally, position the cursor between the chosen bounds, near the minimum, and press **[ENTER]**.

`4:` Choose `4:maximum` and repeat the same steps to find the local maximum of f between x = 0 and x = 1.

`5:` The graphs of f and g intersect once in the given window. Choose `5:intersect`, press **[ENTER]** when asked if `Y1` is the "first curve," and press **[ENTER]** when asked if `Y2` is the "second curve." Position the cursor near the intersection point and press **[ENTER]**.

`6:` To find $f'(2.8)$, for instance, choose `6:dy/dx`, toggle to `Y1`, input x = 2.8, and press **[ENTER]** .

Finding an inflection point: Although the TI-84 has no menu option for finding the inflection point of f, we can get around this by finding the extrema of $f'(x) = 3(x-2)^2 - 5$. Enter `\Y3=3(X-2)^2-5`, and note that f' has a minimum. This point represents the point on the graph of f of maximum decrease. Use `3:minimum` to find the x-coordinate of the inflection point. Plug this x back into f to find the y-coordinate of the inflection point.