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.

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 \Y$_1$=(X−2)^3−5X+12 and \Y$_2$=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 Y$_1$ and Y$_2$ 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 Y$_1$. 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 Y$_1$. 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 Y$_1$ is the "first curve," and press **[ENTER]** when asked if Y$_2$ 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 Y$_1$, 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 \Y$_3$=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.