Second Derivatives Graphical Activity – part A

After working with applications of second derivatives, this activity would be given. Students will work on individual whiteboards (or on paper). Each will be given a copy of the activity below and asked to satisfy the criteria of the prompt. Students will then share their graph with a neighbor. They are to discuss commonalities and difference their graphs have, identifying what features are required to be the same and which are able to differ.

Function Sketching Activity IV - a

Consider a function f. We are given the following information:

- $f(0) = 1$,
- $f(x) > 0$ for $x < 2$,
- $f(x) < 0$ for $x > 2$,
- $f(2)$ does not exist.

- $\lim_{x \to -\infty} f(x) = 0$,
- $\lim_{x \to 2^-} f(x) = \infty$,
- $\lim_{x \to 2^+} f(x) = -1$,
- $\lim_{x \to \infty} f(x) = -\infty$

- $f'(0) = 1$,
- $f'(x) > 0$ for $x < 2$,
- $f'(x) < 0$ for $x > 2$,
- $f'(2)$ does not exist.

- $f''(x) > 0$ for $x < 2$,
- $f''(x) < 0$ for $x > 2$,

Task: Sketch a possible graph of $y = f(x)$ based on the given information. Be prepared to justify to a classmate what features the graph must have or cannot have and how your graph meets those criteria.