

## CURVE SKETCHING TECHNIQUES

COLTON GRAINGER (MATH 1300)

Print your **full name** and **three digit section number** in the top right corner.

1. To graph a function, a useful first step is to
  - (A) find the domain of the function
  - (B) find the intercepts and plot a few additional points
  - (C) look for symmetry: even, odd, periodic, mirror symmetry, half-turn symmetry
  - (D) compute the derivative
  - (E) compute the second derivative
2. What information **CAN WE NOT** obtain from the first derivative?
  - (A) roots of the function
  - (B) critical points
  - (C) points of inflection
  - (D) local extreme values
  - (E) neither (D) and (C)
3. What information **CAN WE** obtain from the second derivative?
  - (A) intervals where the function is positive or negative
  - (B) intervals where the function increases and decreases
  - (C) intervals where the function is concave up and concave down
  - (D)  $y$ -values of horizontal asymptotes
  - (E) all of the above

**End of quiz.** Perhaps take an extra minute to read these subtle tips from Vipul Naik [1] on curve sketching.

- When graphing a function, there may be many steps where you need to do some calculations and solve equations and you are unable to carry them out effectively. You can skip some of the steps and come back to them later.
- If you cannot solve an equation exactly, try to approximate the locations of roots using the intermediate value theorem or other results such as Rolle's theorem.
- In some cases, it is helpful to graph multiple functions together, on the same graph. For instance, we may be interested in graphing a function and its second and higher derivatives. There are other examples, such as graphing a function and its translates, or a function and its multiplicative shifts.
- Once you've determined some points of interest, use the information on increase/decrease and concave up/down to join these points. To make your graph a little better, compute the first derivative (possibly one-sided) at each of these points and start off your graph appropriately at that point.

[1] V. Naik, "Math 152 Course Notes" [Online]. Available: <https://vipulnaik.com/math-152/>

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Repo: <https://github.com/coltongrainger/fy19ta>.