Curve sketching calculus cheat sheet

What can the calculation tell us about the curve sketch? Turns out, pretty much! In this article, you'll see a list of the 10 key features that describe a graph. While you cannot be tested on your artistic ability to sketch a curve on AP calculation exams, you will be expected to determine these specific graphic features. Guide to the Sketch Curve The ten steps of the sketch curve each requires a specific tool. But some of the steps are closely related. In the list below, you'll see a few steps grouped if based on similar methods. Algebra and Pre-calculation Domain and Interval y-Intercept x-Intercept(s) Vertical Symmetry Limits Asymptot(s) Horizontal and/or Oblique Asymptot(s) First Derivative Growth/Relative Decrease Extreme Two Derived Concavity Inflection Points Some books outline these steps differently, sometimes combining elements together. So it's not unusual to see The Eight Steps for The Skeking Curve, etc. Let's briefly recap what each term means. More details can be found at AP Calculation Review Review: Graphic Analysis, for example. Step 1. Determining the range and range The scope of an f(x) function is the set of all input values (x values) for the function. The range of an f(x) function is the set of all output values (y values) for the function. Methods for finding the domain and range vary from problem to problem. Here is a good review. Step 2. Find y-Intercept intercepty y of a function f(x) is the point at which the graph crosses the y-axis. Simply connect 0. Intercept y is: (0, f(0)). Step 3. Find x-Intercept(s) An x-interception of an f(x) function is any point at which the graph crosses the x-axis. To find x intercepts, resolve f(x) = 0. Step 4. Look for symmetry A graph can display different types of symmetry. Three main symmetries are particularly important: even, strange and periodic symmetry. Even symmetry. One function is even if its graph is symmetrical by reflection over the y axis. Strange symmetry. A function is strange if its graph is symmetrical with a rotation of 180 degrees around the origin. Periodicity. A function is periodic if it is only if its values are repeated regularly. That is, if there is a value p > 0, so f(x + p) = f(x) for all x in its field. The algebraic test for even/odd is to connect (-x) to the function. If f(-x) = f(x), then f is equal. If f(-x) = –f(x), then f is odd. In AP Calculation exams, periodicity occurs only in trigonometric functions. Step 5. Find any Vertical Asymptote(s) A vertical asymptote for a function is a vertical line x = k that shows where the function becomes boundless. For details, see asymptotes function?. Step 6. Find horizontal and/or oblique asymptot(s) A horizontal asymptot for a function is a horizontal line that the function graph approaches as x approaches ∞ or -∞. An oblique asymptotes for function is a slanted line that the function approaches as x approaches ∞ or -∞. Both horizontal and oblique asymptotes measure the final behavior of a function. For details, see find the horizontal asymptotes of a function? and find Oblique Asymptotes of a function?. Step 7. Determine the ranges of increase and decrease in function A increase over an interval if the chart increases as you track it from left to right. A function decreases at an interval if the chart falls as you track it from left to right. The first derivative measures increase/decrease as follows: If f '(x) > 0 at a range, then f increases at that range. If f '(x) < 0 at a range, then f decreases on that range. Step 8. Locate Relative Extreme Relative term Relatively extreme refers to both the relative minimum points and the relative maximum points in a graph. A graph has a maximum relative to x = c if f(c) > f(x) for all x in a neighborhood small enough to c. A graph has a relative minimum of x = c if f(c) < f(x) for all x in a neighborhood small enough to c. Relative highs (maximum plural) and lows (minimum plural) are the peaks and valleys of the graph. There can be many relative and minimum highs in any given graph. Relative extremity occur at points where f '(x) = 0 or f '(x) does not exist. Use the first derived test to classify them. This graph increases, reaching a relative maximum, then decreases in the relative minimum, and eventually increases thereafter. Step 9. Determining concavity concavy intervals is a measure of how curved the function graph is at different points. a linear function has zero concavity at all points, because a line simply does not bend. A graph is concave upwards over an interval if the tangent line drops below the curve at each point in the range. In other words, the graph curves up, away from its tangent lines. A graph is concave down over an interval if the tangent line drops above the curve at each point in the range. In other words, the graph curves down, away from its tangent lines. Here's a way to remember the definitions: Concave up looks like a cup, and concaves down looks like a frown. The second derived conccavity measures: If f'(x) > 0 on a range, then f is concave up on that range. If f '(x) < 0 at a range, then f is concave down on that range. Step 10. Locate inflection points Any point at which concavity changes (top to bottom or down) is called an inflection point. Any point at which f '(x) = 0 or f '(x) does not exist is a possible inflection point. Look for changes in concavity to determine if these are real inflection points. This graph shows a change in from concave down to concave up. The inflection point is where the transition takes place. Final thoughts Short article highlights only the steps for sketching the exact curve. Now it's up to you to familiarize yourself with different methods and tools that will help you analyze the chart of any function. Shaun earned his Ph.D. in Mathematics from Ohio State University in 2008 (Go Bucks!!). He obtained a bachelor's degree in mathematics with a minor in computer science from Oberlin College in 2002. In addition, Shaun obtained a B. Mus. from the Oberlin Conservatory that same year, specializing in musical composition. Shaun still loves music -- almost as much as math! - and he (thinks he) can play piano, guitar, and bass. Shaun has taught and tutored students in mathematics for about a decade, and hopes that his experience can help you succeed! Magoosh Blog Comment Policy: To create the best experience for our readers, we approve and respond to comments that are relevant to the article, general enough to be helpful to other students, concise, and well written! :) If the comment was not approved, it probably did not follow these rules. If you are a Premium Magoosh student and want more personalized services, you can use the Help tab in the Magoosh dashboard. Thank! What can the calculation tell us about the curve sketch? Turns out, pretty much! 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