How to go from derivative to original function

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How to go from derivative to original function graph. How to go from second derivative to original function. How to go from derivative to original function calculator. How to go from first derivative to original function. How to change derivative to original function.

Notes, Lesson 2.10 What does f say about f ? The first derivative of a function is an expression that tells us the slope of a tangent line to the curve at any time. Because of this definition, the first derivative of a function tells us a lot about the function. If it's positive, then it must be on the rise. If it's negative, then it must be decreasing. If it is zero, then it must be at a relative maximum or relative minimum. It tells us similar things about . It also gives us valuable information about . In particular it tells us when the function is concave, concave down, or there is an inflection point. This same kind of information is shown about and so on. increase + decreasing – relative min. or max. 0 concave increasing + concave decreasing – relative inflection point min. or max. 0 concave increasing + concave decreasing – relative inflection point min. or max. 0 concave up increasing concave downward decreasing inflection point relative min. or max. concave downward inflection point The following Maple command results in the graph on the left: > plot ([x^3+3*x^2,3*x^2+6*x],x=-4..4,y=-10...10); The red graph is the graph of the function: and the green graph is the graph of its derivative: Find the range (i) on the function where the function is increasing. Are you here? Now take a look at the green derivative curve over the same ranges. Did you notice anything? Do you see that over these same intervals, that the derivative curve is above the x-axis? Note: a positive number on the derivative curve correlates with the original function as it increases. Where on the red function curve do you notice that the curve is changing from increasing to decreasing? (These points are called critical points) Did you respond when x is equal to -2 and when x is equal to 0? Now take a look at the green derivative curve at those two x values. Did you notice anything? Do you see that at these two points the derivative curve is equal to zero? Note: when the derived curve is equal to zero, the original function must be at a critical point, i.e., the curve is changing from increasing to decreasing or seen versa. Find the range (i) on the function where the function is decreasing. - You got that? Now take a look at the green derivative curve on the same range. Did you notice anything? You see above this same range, that the derivative curve is less than the x-axis? Note: A negative number on the derivative curve correlates with the original function while it is decreasing. Using your tools to enrich the Calculation CD (which came with your book), load and run Module 2.10. This module will allow you to practice using graphical information about f' to determine the slope of the graph f. Definition: Antiderivative An antiderivative of f is a function F such that F' = f. Here we have the reverse of theWe have studied. Let's start with the derivative, and we want to find the function. This type of discovery process is common to scientific experimentation and data collection. First, we must recognize that different functions can lead to the same derivative. See the example below: Here we see a family of curves traced with their common derivative. The family of parabolic functions is:, where C assumes the values: -1, 0, 1, 2, 3 and 4. The straight line in the graph above is. It is the derivative function for all six parabolic functions. Because a derivative is mainly a tool to determine the form of a function, the position of a graph does not affect the shape. Therefore the congruent curves that are oriented the same, but have a different position have the same derivative. Check the concepts A derivative is a function that measures the slope. It depends on x somehow, and is located differentiating a function of the form y = f (x). When X is replaced in the derivative, the result is the slope of the original function y = f (x). There are many different ways to indicate the functioning of differentiation, also known how to find or take the derivative. The choice of notation depends on the type of function to be evaluated and from personal preference. Suppose we have a general function: y = f (x). All the following notations can be read as "the derivative of you compared to X" or less formally, "the derivative of the function." F '(X) F' Y 'DF / DX DY / DX D / DX [F (X)]. [Hint: Do not read the last three terms as fractions, read them as a transaction. For example, read: "DX / DY = 3x" as: "The function that gives the slope is equal to 3x" we try some examples. Suppose we have the function: y = 4x3 + x2 + 3. After applying the rules of differentiation, we end up with the following result: dy / dx = 12x2 + 2x. How do we interpret this? First, decide which part of the original function (y = 4x3 + x2 + 3) you are interested in. For example, suppose you want to know Y slope when the X variable takes a value of 2. X = 2 substitute in the slope function and resolving: DY / DX = 12 (2) 2 + 2 (2) = 48 + 4 = 52. Therefore, we discovered that when X = 2, the Y function has a slope of + 52. Now for the practical part. How to determine the slope function? Almost all the functions you will see in economics can be differentiated using a fairly short list of rules or formulas, which will be presented in the next different sections. How to apply the rules of differentiation You understand that differentiation is the process of finding the function of the slope, the actual application of the rules is simple. First, a general strategy. The rules are applied at each time within a function separately. Then the results of the differentiation of each term are added together, paying attention to preserving the signs. [For example, the sum of 3x and negative 2x2 is 3x minus 2x2.]. Do not forget that a term like "x" has a positive coefficient. Coefficients and signs must be properly transported through all operations, especially in differentiation. The differentiation rules are cumulative, in the sense that more parts a function has, more rules than must be applied. Let us begin with some specific examples, and then the general rules will be presented in a table form. Take the simple function: y = C, and let C be a constant, as 15. The derivative of any constant term is 0, according to our first rule. This makes sense because the slope is defined as the change in the y variable for a date change in the x variable. Suppose x goes from 10 to 11; y is still equal to 15 in this function, and does not change, so the slope is 0. Note that this graphic function as a horizontal line. Now, add another term to form the linear function y = 2x + 15. The next rule states that when x is at the power of one, the slope is the coefficient on that x. This continues to make sense, since a change of x is multiplied by 2 to determine the resulting change in y. We add this to the derivative of the constant, which is 0 from our previous rule, and the slope of the total function is 2. Now, suppose the variable is brought to a higher power. We can then form a typical non-linear function like y = 5x3 + 10. The power rule combined with the coefficient rule is used as follows: pull out the coefficient, multiply it by the power of x, then multiply that term by x, brought to the power of n - 1. Therefore, the derivative of 5x3 is equal to (5)(3)(x)(3 - 1); simplify to get 15x2. Add to the derivative of the constant which is 0, and the total derivative is 15x2. Note that we do not yet know the slope, but rather the formula for the slope. For a given x, as x = 1, we can calculate the slope as 15. In clearer terms, when x equals 1, the function (y = 5x3 + 10) has a gradient of 15. These rules cover all polynomials, and now we add some rules to deal with other types of non-linear functions. It is not so obvious because the application of the rest of the rules still leads to find a function for the slope, and in a regular calculation class you would try it repeatedly. Here, we want to focus on the economic application of the calculation, so we will take the word of Newton for it that itwork, memorize some, and move on with the economy! The most important step for the rest of the rules is to correctly identify the form, or how the terms are For functions that are summaries or differences in terms, we can formalize the above strategy as follows: if y = f (x) + g (x), then dy / dx = f '(x) + g' (x) .Ã, here is an opportunity to practice reading the symbols. Ã, read this rule as: if y is the same as the sum of two terms if the total function is f â € "g, then the derivative is the derivative of the term without the derivative of the term g. The rule of the product applies to the functions that are the product of two terms, both of X employees, for example, y = (x â € "3) (2x2 â €" 1) .ã, the simpler approach would be Multiply the two terms, then take the resulting polynomial derivative according to the above rules., Or you have the possibility of applying the following rule. Given y = f (x) g (x); DY / DX = Fâ € ™ G + Gâ € ™ F. .Ã, to apply it to the above problem, notice that f (x) = (x â € "3) eg (x)) = (2x2 â €" 1); f '(x) = 1 eg' (x) = 4x.ã, then dy / dx = (1) (2x2 â € "1) + (4x) (x â €" 3) .ã, simplify, and dye / dx = 2x2 â € "1 + 4x2 â €" 12x, or 6x2 â € "12x â €" 1. The quotient rule applies in the same way to the functions where the FEG Terms are a quotient., suppose we have The Y = (X + 3) / (- X2) function .Ã, then follow this rule: given y = f (x) / g (x), ã, dy / right = (fâ € â € "gâ € ™ f) / g2.ã, Ã, Ã, again, identifies f = again f = (x + 3) eg = -x2; f '(x) = 1 and g' (x) = â € "2; and g2 = x4.ã, then replace with: dy / dx = [(1) (-x2) â € "(- 2) (x + 3)] / x4. Simplify DY / DXÃ, = (-x2 + 2x + 6) / X4. We combine rules by type of function and corresponding graphs. Type of function Function Chart Rule Interpretation Y = constant Y = C Horizontal line DY / DXÃ, = 0 slope = 0; y = linear function y = ax + b straight line dy / dx = a slope = coefficient on xy = order of order 2 or higher y = axn + b non-linear, one or more point points dy / dx = anxn 1 the derivativa It is a function, the actual slope depends on the position (ie X value) y = sum or differences of 2 functions y = f (x) + g (x) dy non-linear / dx = f '(x) + g '(x) .Ã, take the derivative of each term separately, then combine it. y = product of two functions, y = [x) g (x)] typically non-linear ty dy / dx = fâ € ™ g + g ™ f.Ã, starts identifying f, g, f ', g' Y = quotient or ratio of two functions y = f (x) / g (x) typically non-linear dy / dx = (fâ € â € â € ™ f) / g2.ã, ã, begins identifying f, G ', and G2 rules of differentiation not so basic There are two other rules that you will probably meet in your economics studies. The most difficult part of these rules is to identify what parts of the functions the rules apply. Ã, actually applying the rule Ãƒ ì a simple replacement and multiplication issue. Building on the rules of the previous section, and provide ways to deal with more and more complicated functions, while still using the same techniques. The power function rule: in the previous rules, we have addressed the powers connected to a single variable, such as x2, or x5. Suppose, however, that your equation brings more than a simple X variable to a power. For example, y = (2x + 3) 4 In this case, the entire deadline (2x + 3) is raised to the fourth power. To face cases like this, first identify and rename the internal term in parenthesis: 2x + 3 = g (x). Then the problem now becomes, notice that your goal is still to take the derivative of you compared to X. However, X is in the operation phase from two functions; First of g (multiplies x by 2 and adds to 3), and then that result is brought to the power of four. Therefore, when we take the derivatives, we must take both operations on X. First, use the power rule from the table above to get :. Note that the rule has been applied to G (X) as a whole. Then take the derivative of g (x) = 2x + 3, using the appropriate rule from the table :. Notice the notation change. "G" is used because we were finding change in g, compared to a change in X. Now, both sides are multiplied to obtain the final result: we remind you that derivatives are defined as a function of X. Replace the g (x) within the end with (2x + 3) in order to satisfy this need. Then simplify combining coefficients 4 and 2, and changing the power (4-1) to 3: now, we can set the general rule. When a function takes on the following form: then the rule to take the derivative is: the chain rule: the second rule in this section is actually only a generalization of the power rule above. It is used when X is managed more than once, but is not limited only to cases involving powers. Since it is already understood the above problem, redistribute it using the chain rule, so you can focus on the technique. Given the same problem: rename the parts of the problem as follows: And then the whole problem can be expressed as: this type of function is also known as a composite function. The derivative of a composite function is equal to the derivative of y compared to U, times the derivative of u compared to x: specifically in our problem: we remind you that a derivative is defined as a function of x, not u. Substitute in 2x + 3 per u: and the problem is complete. The formal the rule is as follows. when a function takes the following form: â function type graph function rule y = constant y = c horizontal line dy / dxa = 0 slope = 0; y = linear function y = ax + b straight line dy / dx = a gradient = coefficient on xy = polynomial of order 2 or higher y = axn + b nonlinear, one or more points of rotation dy / dx = an axn-1 derivative is a derivative function y = product of two functions y = [f (x) g (x)] typically not linear dy / dx = f'g + g'f. # beginning by identifying f, g, f ', g' y = quotient or relationship of two functions y = f (x) / g (x) typically not linear dy / dx = (f'g - g'f) / g2. you can review the sections on the functions and natural logarithmic charts and exponential functions and graphs before starting this section. natural logarithmic functions when a function takes logarithmic form: â We can apply the chain rule, firstly identifying the parts: now, take the derivative of each part: â for example, if the function is: â First of all, we begin with a simple exponent and its derivative. when a function takes shapeSo, the derivative of the function follows the rule: ÃÂ" Ã It's not a printing error! The derivative of the es is ex. "If the power of E is a function of x, not just the variable X, then use the chain rule: Ã Ã Ã Ã Ã Ã Ã Ã Ã Ã Ã Ã Ã ÃÂ" Ã Â"Â" So the derivative of Y with respect to x is Like: For example, suppose you take the derivative of the following function: Define the yeu parts, and take their respective derivatives: so the Y derivative compared to AX is: updated table of derivatives now we can add these two special cases to our table : Type of function Function Function Interpretation of the graph rule Y = constant y = c horizontal line dy / dx = 0 slope = 0; Y = Linear function Y = AX + B DY / DX Straight = SLOPE = Coefficient on XY = Order polynomial 2 or higher Y = AXN + B Non-linear, one or more turning points DY / DX = ANxN-1 derivative is A function, the actual slope depends on the position (ie the value of x) y = sum or differences of 2 functions y = f (x) + g (x) non-linear dy / dx = f '(x) + g' (x). Take derivative of each term separately, then combine. y = Product of two functions, y = [x) g (x)] typically non-linear dy / dx = f'g + g'f. Start identifying f, g, f ', g' y = quotient or ratio of two functions y = f (x) / g (x) typically non-linear dy / dx = (f'g - g'f) / g2. Starting Identifying F, G, F, G ', and G2 YGeneralized Power Function NonLlinear Identify G (x) Y = Composite Function / Chain Rule NonLinear Y It is a function of U, and u is a function of X. Y = natural log function natural trunk special case of the chain rule y = exponential function Special case of the chain rule derivatives of the superior order just as a first derivative gives the slope or the rate of change of a function, an order derivative Superior gives the rate of change of the previous derivative. We will take care of how this adapts to economic analysis in a future section, [link: economic interpretation of higher order derivatives] but for now, we will define the technique and then we will describe the behavior with some simple examples. To find a superior derivative, simply reapply the rules of differentiation to the previous derivative. For example, suppose you have the following function: according to our rules, we can find the slope formula taking the first derivative: take the second derivative by applying the rules again, this time to you, not y: if we need a Third derivative, we differentiate the second derivative, and so on for each subsequent derivative. Note that the notation for the second derivative is created by adding a second first. Other notations are also based on the corresponding first derivative form. Here are some examples of the most common notations for derivatives and derivatives of superior orders. Function First derivative second derivative third derivative now for some examples of what a superior derivative is actually. Let's start with a non-linear function and take a first and second derivative. Recall from previous sections that The equation will display the chart like a parable that opens down [link: Chart Binomial functions]. Function before derivative second derivative to understand the meaning of derivatives, we take a couple of values of X, and we calculate the value of derivatives in those points. X value value of the function to the first derivative to the second derivative to xxx = 0 x = 1 x = 2 then, how do we interpret this information? Ã, when x is equal to 0, we know that the slope of the function, or change rate In Y for a given change in X (from the first derivative) is 6.ã, Similarly, the second derivative tells us that the rate of variation in other words, when X changes, we expect the slope of -2 changes, or Decrease by 2.ã, we can check this by changing x from 0 to 1, and noticing that the slope has changed from 6 to 4, then decreasing 2.ã, summarizing, the first derivative gives us the slope, and the second derivative there Due the variation in economics, the first two derivatives will be the most useful, so for now we stop here. There, Ã, Ã, Ã, Ã, [index] [index]

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