

Chapter 4 (sections 1–4)

Given a formula for a function, be able to find a formula for the derivative of that function. Look at #1–21 from 4.1, #1–21 from 4.2, #1–30 from 4.3, and #3–26 from 4.4.

If n , m , b , c , and a are constants ($a > 0$), then

- $\frac{d}{dx}(x^n) = nx^{n-1}$
- $\frac{d}{dx}(\ln x) = \frac{1}{x}$
- $\frac{d}{dx}(a^x) = \ln a \cdot a^x$
- $\frac{d}{dx}(c) = 0$
- $\frac{d}{dx}(mx + b) = m$
- $\frac{d}{dx}(e^x) = e^x$
- $\frac{d}{dx}[f(x) \pm g(x)] = f'(x) \pm g'(x)$
- $\frac{d}{dx}[cf(x)] = cf'(x)$
- **Chain Rule:** $\frac{d}{dx}[f(g(x))] = f'(g(x)) \cdot g'(x)$ $\left(\text{also written as } \frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx} \right)$
- **Product Rule:** $\frac{d}{dx}[f(x) \cdot g(x)] = f'(x) \cdot g(x) + f(x) \cdot g'(x)$
- **Quotient Rule:** $\frac{d}{dx} \left[\frac{f(x)}{g(x)} \right] = \frac{f'(x) \cdot g(x) - f(x) \cdot g'(x)}{(g(x))^2}$

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Know what the derivative means (looking at chapter 2 and your old exams, quizzes, and homeworks may help), and know how to apply this to problems like the following:

- Given a formula for some quantity, find the rate at which that quantity is changing. Look at #27, 36, 37 from 4.1, #27, 30, 37 from 4.2, #35, 37 from 4.3, #29 from 4.4.
- Sketch the graph of $f(x) = \text{some formula}$. Find the slope of this curve at any given point. Also be able to sketch the tangent line at any particular point and find the equation of that tangent line. You should be able to find the equation of the tangent line without the use of a calculator. Look at #22, 32, 33 from 4.1, #23, 32 from 4.2, #31 from 4.3, #30 from 4.4.
- The cost (or revenue) function for some item is given by *some formula*. Find a formula for the marginal cost (or revenue). For a particular value of q , explain what this means in practical terms. Look at #34 from 4.1, #34 from 4.3.
- The position of an object is given by *some formula*. Find a formula for the velocity of that object and answer questions about the position and velocity of the object. Look at #43 from 4.1.

Chapter 5 (sections 1–3)

- Be able to find critical points, inflection points, local maxima, and local minima, and be able to use this information to graph functions without using your calculator. Look at #5–8, 17 from 5.2, #1 from quiz 13.
- Be able to maximize quantities such as profit or revenue. Look at #16, 17, 21, 22, 24 from 5.3, #2 from quiz 13.

Chapter 6 (sections 5–6)

- Be able to find antiderivatives and indefinite integrals. Look at #1–22, 34–46 from 6.5. It will help to memorize the boxed-off formulas given on pages 318–320. You don't need to know those involving $\sin x$ or $\cos x$.
- Be able to evaluate definite integrals exactly without using a calculator. Look at #1–12 from 6.6.