

Chapter 2

- 2.3** Given a function $y = f(x)$, we learned how to compute $f'(a)$ at any point $x = a$. So we see that $f'(x)$ is itself a function. Given a graph of $f(x)$, you should be able to sketch a graph of $f'(x)$. Remember that in the graph of $f'(x)$, the y -values are just recording what the slopes are in the graph of $f(x)$. Another problem may give you information about $f'(x)$ and ask you to sketch a graph of $f(x)$. Knowing where $f'(x)$ is positive, negative, or zero tells you where $f(x)$ is increasing, decreasing, or constant – this enables you to sketch a graph of $f(x)$. Look at #1, 13, 15, 17, 18, 26, 27, 28, 32 from section 2.3.
- 2.4** In this section you are asked to give the practical meaning of statements such as $f(8) = 100$ and $f'(8) = 4$. Knowing the units for $f(x)$ and $f'(x)$ makes this easier to do. You should also be able to use the above information to approximate $f(9)$, $f(8.1)$, $f(7.3)$, etc. Look at #1, 2, 8, 10, 11, 12, 15, 17 from section 2.4.
- 2.5** Graph a function which is increasing (or decreasing) at an increasing, decreasing, or constant rate. Look at a graph or table of values for $f(x)$ and answer questions about $f(x)$, $f'(x)$ or $f''(x)$. If the graph of $f(x)$ is concave up (or down) on an interval, then know what this tells you about $f''(x)$ on that interval. Look at #1, 2, 3, 4, 5, 8, 15, 16 from 2.5.
- 2.6** Given a cost function and a revenue function, be able to compute marginal cost, marginal revenue, and profit. Know the connection between maximum profit and these marginal quantities. Know the practical meaning of these marginal quantities. Look at #1, 2, 3, 6, 9, 10, 11, 12, 13 from section 2.6.

Chapter 4 (sections 1–4)

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. Look at #22 from 4.1.
- 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.

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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

- $\frac{d}{dx}(c) = 0$
- $\frac{d}{dx}(mx + b) = m$
- $\frac{d}{dx}(x^n) = nx^{n-1}$
- $\frac{d}{dx}(a^x) = \ln a \cdot a^x$
- $\frac{d}{dx}(e^x) = e^x$
- $\frac{d}{dx}(\ln x) = \frac{1}{x}$
- $\frac{d}{dx}[f(x) \pm g(x)] = f'(x) \pm g'(x)$
- $\frac{d}{dx}[cf(x)] = cf'(x)$
- **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:** $\frac{d}{dx} \left[\frac{f(x)}{g(x)} \right] = \frac{f'(x) \cdot g(x) - f(x) \cdot g'(x)}{(g(x))^2}$

Notes

- You should bring your own calculator and be able to use its graphing and table features effectively. For graphing functions, you will have to decide the appropriate **WINDOW**. You should also be proficient at using the built-in features found under **2nd** – **CALC** for the TI-82 and TI-83. For the TI-85 and TI-86, use **RANGE** to enter the appropriate viewing window, and look for the built-in features under **GRAPH** – **MORE** – **MATH**.
- There will be a review session Thursday, March 21st, beginning at 8:00 PM in LeConte 412.
- The test will be in class on Friday, March 22nd. No make-ups will be given for any reason.

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