

MathPro Tutoring Practice Tests

This chapter test correlates with:

Calculus of a Single Variable, 8th ed.

by Larson, Hostetler, Edwards

Houghton Mifflin, 2006

Calculus with Analytic Geometry, 8th ed.

or by Larson, Hostetler, Edwards

Houghton Mifflin, 2006

Chapter 2: Differentiation

[Also:
7th edition, Chapter 2
6th edition, Chapter 2]

A few notes:

- If you are using a different textbook, this may not be a comprehensive chapter test for you.
- Solutions are available at www.mathprotutoring.com/tests.
- Angle measures are represented using radian measure, unless there is a pressing reason to use degree measure. If degree measure is used, there will always be a ° symbol.
- This test is copyright material. You must obtain express written permission from Linda Sinclair (linda@mathprotutoring.com) in order to duplicate and/or share this test with others.
- Please check www.mathprotutoring.com/tests soon for new tests. New ones will be added just as quickly as they are created.

Calculus Chapter 2 Differentiation

Find the derivative.

1. $f(x) = x^5 - 5x^3 + 2x + 6.$

2. $y = \frac{2x+5}{x-6}.$

3. $g(x) = -2(\sin x)^3.$

4. $y = 4x^2 \tan x.$

5. $g(x) = \frac{(x^2 + 2x - 4)^3}{2x - 3}.$

6. $h(x) = x - \cos^3(4x)$

Use the limit definition of a derivative to find the derivative of each function.

7. $f(x) = x^2 + 3x - 4$

8. $g(x) = \frac{3}{x}$

9. Find the equation of the tangent line to the graph of $y = 2x\sqrt{x^2 + 5}$, at the point where $x = 2$.

10. Find $\frac{dy}{dx}$ when $x = 1$: $-x - 2x^3y = y^2$.
11. Find $\frac{dy}{dx}$ for: $4x^2 + \sin(xy) = 4$.
12. At which point(s) on the graph of $y = \frac{4}{3}x^3 + \frac{1}{2}x^2 + x - 7$ does the tangent line have a slope equal to 4?
13. At which value of x is the tangent line to the graph of $-6y^2 + 2y - 6 = 3x$ vertical?
14. Find the second derivative: $f(x) = \frac{1}{\sqrt{x^2 - 9}}$
15. Show that the derivative of $\cot x$ is $-\csc^2 x$. (Derive: $\frac{d}{dx}[\cot x] = -\csc^2 x$)
16. A stone is dropped into still water, forming a circular ripple. The radius of the ripple increases at a rate of 3 feet per second. At what rate is the circumference of the ripple increasing?
17. A conical tank with vertex down has a diameter of 6 m. It is losing water at a rate of $1 \text{ m}^3/\text{hr}$. If the height of the tank is $\frac{2}{3}$ of its diameter, how fast is the water level changing when the water is 3 m deep?