Product and Quotient Rules and
Higher-Order Derivatives

1. Use the Product Rule to differentiate the
function
(similar to p.147 #1-6)

$$f(x) = (7x - 2)(x^5 + 3)$$

2. Use the Product Rule to differentiate the
function
(similar to p.147 #1-6)

$$f(x) = \sqrt[3]{x}(\cos x)$$

3. Use the Quotient Rule to differentiate
the function
(similar to p.147 #7-12)

$$g(x) = \frac{x^2 + 3}{8x - 1}$$

4. Use the Quotient Rule to differentiate
the function
(similar to p.147 #7-12)

$$h(x) = \frac{x^2}{\sqrt{x} + 2}$$

5. Find f'(x) and f'(c)
(similar to p.147 #13-18)

$$f(x) = \frac{\sin x}{5e^x} \qquad c = 0$$

6. Complete the table without using the Quotient Rule
(similar to p.147 #19-24)

$$y = \frac{8x^3 - 1}{5}$$

7. Complete the table without using the Quotient Rule
(similar to p.147 #19-24)

$$y = \frac{5x^{4/3}}{x}$$

8. Find the derivative of the algebraic function
(similar to p.147 #25-38)

$$f(x) = 2x^5\left(2 + \frac{3}{x-1}\right)$$

9. Find the derivative of the algebraic function
(similar to p.147 #25-38) NEXT TIME

$$f(x) = \sqrt{x}\left(\sqrt[5]{x} + 2\right)$$

10. Find the derivative of the algebraic function
(similar to p.147 #25-38)

$$f(x) = \frac{3 + \dfrac{1}{x}}{x - 5}$$

11. Find the derivative of the transcendental function
(similar to p.147 #39-56)

$$h(x) = \frac{3}{x^2} + 5\sec(x)$$

12. Find the derivative of the transcendental function
(similar to p.147 #39-56)

$$h(x) = \frac{x^2}{\csc(x)}$$

13. Find the derivative of the transcendental function
(similar to p.147 #39-56)

$$y = \frac{e^x}{3e^x + 1}$$

14. Evaluate the derivative of the function at the given point.
(similar to p.148 #61-64)

Function   Point
———————   - - - - -
$f(x) = \csc(x)\sin(x)$ $(2,2)$

15. Evaluate the derivative of the function at the given point.
(similar to p.148 #61-64)

Function   Point
———————   - - - - -
$f(x) = \tan(x)[\sin x - \cos x]$ $\left(\frac{\pi}{4}, 0\right)$

16. Find an equation of the tangent line to the graph of f at the given point.
(similar to p.148 #65-70)

Function   Point
———————   - - - - -
$f(x) = \csc(x)$ $\left(\frac{\pi}{6}, 2\right)$

17. Determine the point(s) at which the graph of the function has a horizontal tangent line
(similar to p.148 #75-78)

$$y = \frac{x^2 + 3}{x^2 + 4}$$

18. Determine the point(s) at which the graph of the function has a horizontal tangent line
(similar to p.148 #75-78)

$$y = e^x \cos(x), \ [0, \pi]$$

19. Find the second derivative of the function
(similar to p.149 #95-102)

$$f(x) = 2x + 5x^{-3}$$

20. Find the second derivative of the function
(similar to p.149 #95-102)

$$f(x) = \csc x$$

21. Find the second derivative of the function
(similar to p.149 #95-102)

$$f(x) = \frac{e^x}{x^2}$$