

such that T and its first n derivatives have the same values at $x = a$ as f and its first n deriva-

10. $\frac{d}{dx} |x^2 + x| = |2x + 1|$

11. If $g(x) = x^5$, then $\lim_{x \rightarrow 2} \frac{g(x) - g(2)}{x - 2} = 80$.

12. $\frac{d^2 y}{dx^2} = \left(\frac{dy}{dx}\right)^2$

13. An equation of the tangent line to the parabola $y = x^2$ at $(-2, 4)$ is $y - 4 = 2x(x + 2)$.

1-46 □ Calculate y' .

1. $y = (x + 2)^8(x + 3)^6$

3. $y = \frac{x}{\sqrt{9 - 4x}}$

5. $y = \sin(\cos x)$

7. $y = xe^{-1/x}$

9. $y = \tan \sqrt{1 - x}$

11. $y = \frac{x}{8 - 3x}$

13. $y = \sec 2\theta$

15. $y = (1 - x^{-1})^{-1}$

17. $y = \csc(\sin^{-1} x)$

2. $y = \sqrt[3]{x} + \frac{1}{\sqrt[3]{x}}$

4. $y = \frac{e^x}{1 + x^2}$

6. $y = \sin^{-1}(e^x)$

8. $y = x^r e^{sx}$

10. $y = \frac{1}{\sin(x - \sin x)}$

12. $y = \left(x + \frac{1}{x^2}\right)^{\sqrt{7}}$

14. $y = -2\sqrt[4]{t^3}$

16. $y = \ln(\csc 5x)$

18. $y = \ln(-2 - x)$

EXERCISES

48. If $g(t) = \csc 2t$, find $g'''(-\pi/8)$.

49. Find y'' if $x^6 + y^6 = 1$.

50. Find $f^{(n)}(x)$ if $f(x) = 1/(2 - x)$.

51. Use mathematical induction to show that if $f(x) = xe^x$, then $f^{(n)}(x) = (x + n)e^x$.

52. Evaluate $\lim_{t \rightarrow 0} \frac{t^3}{\tan^3 2t}$.

53-57 □ Find an equation of the tangent to the curve at the given point.

53. $y = \frac{x}{x^2 - 2}$, $(2, 1)$

54. $\sqrt{x} + \sqrt{y} = 3$, $(4, 1)$

55. $y = \tan x$, $(\pi/3, \sqrt{3})$

56. $v = x\sqrt{1 + x^2}$, $(1, \sqrt{2})$

91. A balloon is rising at a constant speed of 5 ft/s. A boy is cycling along a straight road at a speed of 15 ft/s. When he

96. Evaluate dy if $y = x^3 - 2x^2 + 1$, $x = 2$, and $dx = 0.2$.

97. A window has the shape of a square surmounted by a semi-