

More on Derivatives Test Review

1-3 Find the derivative of the function by using the definition of the derivative.

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

2. $f(x) = \sqrt{x+1}$

3. $f(x) = \frac{4}{x}$

4-7 Find the slope of the tangent line to the graph of the function at the given point.

4. $g(x) = \frac{2}{3}x^2 - \frac{x}{6}, \quad \left(-1, \frac{5}{6}\right)$

5. $h(x) = \frac{3x}{8} - 2x^2, \quad \left(-2, \frac{-35}{4}\right)$

6. $f(x) = \frac{2}{x+1}, \quad (0, 2)$

7. $f(x) = x^3 - 1, \quad (-1, -2)$

8-18 Find the derivative of the function.

8. $f(x) = x^3 - 3x^2$

9. $h(x) = \frac{2}{(3x)^2}$

10. $h(x) = 6\sqrt{x} + 3\sqrt[3]{x}$

11. $f(x) = 3\cos\theta - \frac{\sin\theta}{4}$

12. $g(x) = \frac{5\sin\theta}{3} - 2\theta$

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

14. $g(x) = (x^3 - 3x)(x + 2)$

15. $f(x) = \frac{6x - 5}{x^2 + 1}$

16. $f(x) = \frac{9}{3x^2 - 2x}$

17. $y = \frac{\sin^2 2x}{x^2}$

18. $y = 2x - x^2 \tan x$

19-20 Find an equation of the tangent line to the graph of f at the given point.

19. $f(x) = \frac{2x^3 - 1}{x^2}$ $(1, 1)$

20. $f(x) = \frac{1 + \sin x}{1 - \sin x}$ $(\pi, 1)$

21. The velocity of an object in meters per second is $v(t) = 36 - t^2$ $0 \leq t \leq 6$. Find the velocity and acceleration of the object when $t = 4$.

22-25 Find the second derivative of the function.

22. $g(t) = t^3 - 3t + 2$

23. $h(t) = 4 \sin t - 5 \cos t$

24. $y = 2x^2 + \sin 2x$

25. $y = \sin^2 x$

26-31 Find the derivative of the function.

26. $g(x) = \left(\frac{x-3}{x^2+1} \right)^2$

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

28. $y = \frac{x}{2} - \frac{\sin 2x}{4}$

29. $f(x) = \frac{3x}{\sqrt{x^2+1}}$

30. $y = \frac{\sin \pi x}{x+2}$

31. $y = 3 \cos(3x+1)$

32-33 Find the derivative of the function at the given point.

32. $f(x) = \sqrt{1-x^3}$ $(-2, 3)$

33. $f(x) = \sqrt[3]{x^2-1}$ $(3, 2)$