

Derivatives Quiz Review

Differentiate each function with respect to x .

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

2) $f(x) = -5x^2$

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

4) $f(x) = -2x$

5) $f(x) = 5x^5$

6) $f(x) = 3x^5 - \frac{3}{2}x^4$

7) $f(x) = (2x^5 + 5)(-x^4 + 5)$

$$8) f(x) = (2x^4 - 5x^2 - 3)(4x^3 - 5)$$

$$9) f(x) = (-2x^5 - 4x^4 - 2)(-4x^4 + 3)$$

$$10) f(x) = (3x^3 - 2)(-2x^3 - 4)$$

$$11) f(x) = (-5x^4 - 5)(2x^5 - 2x^3 + 1)$$

$$12) f(x) = (5x^5 + 2)(5x^4 + 2)$$

$$13) f(x) = \frac{4}{2x^2 + 5}$$

$$14) f(x) = \frac{4}{5x^3 + 3}$$

$$15) f(x) = \frac{5x^5 - 3x^2}{5x^4 + 5}$$

$$16) f(x) = \frac{3x^5 - 2x^4}{3x^2 + 4}$$

$$17) f(x) = \frac{2x^4 - 3x^3 + 2x^2}{3x^4 - 2}$$

$$18) f(x) = \frac{2x^5 + 4x^4 + 2x^2}{5x^2 + 5}$$

$$19) f(x) = (5x^5 - 2)^4$$

$$20) f(x) = \sqrt{-5x^3 + 2}$$

$$21) f(x) = \sqrt{-4x^3 - 5}$$

$$22) f(x) = \sqrt[5]{5x + 1}$$

$$23) f(x) = (-x^3 + 4)^2(-4x^2 + 3)$$

$$24) f(x) = (5x^3 - 4)^5(-4x^2 - 5)$$

$$25) f(x) = \left(\frac{3x^4 - 5}{-5x - 3} \right)^4$$

$$26) f(x) = \left(\frac{x^5 - 2}{4x^4 + 3} \right)^5$$

$$27) f(x) = \cos 2x^4$$

$$28) f(x) = \sin 2x^3$$

$$29) f(x) = \sin 5x^5$$

$$30) f(x) = \cos 2x^2$$

$$31) f(x) = (x^5 - 5)\cos 3x^2$$

$$32) f(x) = (-x^3 + 5)\sin 4x^5$$

$$33) f(x) = \frac{\sin 4x^2}{-3x^4 - 2}$$

$$34) f(x) = \frac{\cos 5x^3}{3x^5 - 4}$$

Derivatives Quiz Review

Differentiate each function with respect to x .

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

$$\begin{aligned}f'(x) &= -\frac{10}{3}x^4 - 5x^3 + 9x^2 \\ &= -\frac{10x^4}{3} - 5x^3 + 9x^2\end{aligned}$$

2) $f(x) = -5x^2$

$$f'(x) = -10x$$

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

$$f'(x) = -10x^4 - 3x^3 + 2x^2$$

4) $f(x) = -2x$

$$f'(x) = -2$$

5) $f(x) = 5x^5$

$$f'(x) = 25x^4$$

6) $f(x) = 3x^5 - \frac{3}{2}x^4$

$$f'(x) = 15x^4 - 6x^3$$

7) $f(x) = (2x^5 + 5)(-x^4 + 5)$

$$\begin{aligned}f'(x) &= (2x^5 + 5) \cdot -4x^3 + (-x^4 + 5) \cdot 10x^4 \\ &= -18x^8 + 50x^4 - 20x^3\end{aligned}$$

$$8) f(x) = (2x^4 - 5x^2 - 3)(4x^3 - 5)$$

$$\begin{aligned} f'(x) &= (2x^4 - 5x^2 - 3) \cdot 12x^2 + (4x^3 - 5)(8x^3 - 10x) \\ &= 56x^6 - 100x^4 - 40x^3 - 36x^2 + 50x \end{aligned}$$

$$9) f(x) = (-2x^5 - 4x^4 - 2)(-4x^4 + 3)$$

$$\begin{aligned} f'(x) &= (-2x^5 - 4x^4 - 2) \cdot -16x^3 + (-4x^4 + 3)(-10x^4 - 16x^3) \\ &= 72x^8 + 128x^7 - 30x^4 - 16x^3 \end{aligned}$$

$$10) f(x) = (3x^3 - 2)(-2x^3 - 4)$$

$$\begin{aligned} f'(x) &= (3x^3 - 2) \cdot -6x^2 + (-2x^3 - 4) \cdot 9x^2 \\ &= -36x^5 - 24x^2 \end{aligned}$$

$$11) f(x) = (-5x^4 - 5)(2x^5 - 2x^3 + 1)$$

$$\begin{aligned} f'(x) &= (-5x^4 - 5)(10x^4 - 6x^2) + (2x^5 - 2x^3 + 1) \cdot -20x^3 \\ &= -90x^8 + 70x^6 - 50x^4 - 20x^3 + 30x^2 \end{aligned}$$

$$12) f(x) = (5x^5 + 2)(5x^4 + 2)$$

$$\begin{aligned} f'(x) &= (5x^5 + 2) \cdot 20x^3 + (5x^4 + 2) \cdot 25x^4 \\ &= 225x^8 + 50x^4 + 40x^3 \end{aligned}$$

$$13) f(x) = \frac{4}{2x^2 + 5}$$

$$\begin{aligned} f'(x) &= -\frac{4 \cdot 4x}{(2x^2 + 5)^2} \\ &= -\frac{16x}{4x^4 + 20x^2 + 25} \end{aligned}$$

$$14) f(x) = \frac{4}{5x^3 + 3}$$

$$\begin{aligned} f'(x) &= -\frac{4 \cdot 15x^2}{(5x^3 + 3)^2} \\ &= -\frac{60x^2}{25x^6 + 30x^3 + 9} \end{aligned}$$

$$15) f(x) = \frac{5x^5 - 3x^2}{5x^4 + 5}$$

$$\begin{aligned} f'(x) &= \frac{(5x^4 + 5)(25x^4 - 6x) - (5x^5 - 3x^2) \cdot 20x^3}{(5x^4 + 5)^2} \\ &= \frac{5x^8 + 6x^5 + 25x^4 - 6x}{5x^8 + 10x^4 + 5} \end{aligned}$$

$$16) f(x) = \frac{3x^5 - 2x^4}{3x^2 + 4}$$

$$\begin{aligned} f'(x) &= \frac{(3x^2 + 4)(15x^4 - 8x^3) - (3x^5 - 2x^4) \cdot 6x}{(3x^2 + 4)^2} \\ &= \frac{27x^6 - 12x^5 + 60x^4 - 32x^3}{9x^4 + 24x^2 + 16} \end{aligned}$$

$$17) f(x) = \frac{2x^4 - 3x^3 + 2x^2}{3x^4 - 2}$$

$$\begin{aligned} f'(x) &= \frac{(3x^4 - 2)(8x^3 - 9x^2 + 4x) - (2x^4 - 3x^3 + 2x^2) \cdot 12x^3}{(3x^4 - 2)^2} \\ &= \frac{9x^6 - 12x^5 - 16x^3 + 18x^2 - 8x}{9x^8 - 12x^4 + 4} \end{aligned}$$

$$18) f(x) = \frac{2x^5 + 4x^4 + 2x^2}{5x^2 + 5}$$

$$\begin{aligned} f'(x) &= \frac{(5x^2 + 5)(10x^4 + 16x^3 + 4x) - (2x^5 + 4x^4 + 2x^2) \cdot 10x}{(5x^2 + 5)^2} \\ &= \frac{6x^6 + 8x^5 + 10x^4 + 16x^3 + 4x}{5x^4 + 10x^2 + 5} \end{aligned}$$

$$19) f(x) = (5x^5 - 2)^4$$

$$\begin{aligned} f'(x) &= 4(5x^5 - 2)^3 \cdot 25x^4 \\ &= 100x^4(5x^5 - 2)^3 \end{aligned}$$

$$20) f(x) = \sqrt{-5x^3 + 2}$$

$$\begin{aligned} f'(x) &= \frac{1}{2}(-5x^3 + 2)^{-\frac{1}{2}} \cdot -15x^2 \\ &= -\frac{15x^2}{2(-5x^3 + 2)^{\frac{1}{2}}} \end{aligned}$$

$$21) f(x) = \sqrt{-4x^3 - 5}$$

$$\begin{aligned} f'(x) &= \frac{1}{2}(-4x^3 - 5)^{-\frac{1}{2}} \cdot -12x^2 \\ &= -\frac{6x^2}{(-4x^3 - 5)^{\frac{1}{2}}} \end{aligned}$$

$$22) f(x) = \sqrt[5]{5x + 1}$$

$$\begin{aligned} f'(x) &= \frac{1}{5}(5x + 1)^{-\frac{4}{5}} \cdot 5 \\ &= \frac{1}{(5x + 1)^{\frac{4}{5}}} \end{aligned}$$

$$23) f(x) = (-x^3 + 4)^2(-4x^2 + 3)$$

$$\begin{aligned} f'(x) &= (-x^3 + 4)^2 \cdot -8x + (-4x^2 + 3) \cdot 2(-x^3 + 4) \cdot -3x^2 \\ &= 2x(-x^3 + 4)(16x^3 - 16 - 9x) \end{aligned}$$

$$24) f(x) = (5x^3 - 4)^5(-4x^2 - 5)$$

$$\begin{aligned} f'(x) &= (5x^3 - 4)^5 \cdot -8x + (-4x^2 - 5) \cdot 5(5x^3 - 4)^4 \cdot 15x^2 \\ &= x(5x^3 - 4)^4(-340x^3 + 32 - 375x) \end{aligned}$$

$$25) f(x) = \left(\frac{3x^4 - 5}{-5x - 3} \right)^4$$

$$\begin{aligned} f'(x) &= 4 \cdot \left(\frac{3x^4 - 5}{-5x - 3} \right)^3 \cdot \frac{(-5x - 3) \cdot 12x^3 - (3x^4 - 5) \cdot -5}{(-5x - 3)^2} \\ &= \frac{4(3x^4 - 5)^3(-45x^4 - 36x^3 - 25)}{(-5x - 3)^5} \end{aligned}$$

$$26) f(x) = \left(\frac{x^5 - 2}{4x^4 + 3} \right)^5$$

$$\begin{aligned} f'(x) &= 5 \cdot \left(\frac{x^5 - 2}{4x^4 + 3} \right)^4 \cdot \frac{(4x^4 + 3) \cdot 5x^4 - (x^5 - 2) \cdot 16x^3}{(4x^4 + 3)^2} \\ &= \frac{5x^3(x^5 - 2)^4(4x^5 + 15x + 32)}{(4x^4 + 3)^6} \end{aligned}$$

$$27) f(x) = \cos 2x^4$$

$$\begin{aligned} f'(x) &= -\sin 2x^4 \cdot 8x^3 \\ &= -8x^3 \sin 2x^4 \end{aligned}$$

$$28) f(x) = \sin 2x^3$$

$$\begin{aligned} f'(x) &= \cos 2x^3 \cdot 6x^2 \\ &= 6x^2 \cos 2x^3 \end{aligned}$$

$$29) f(x) = \sin 5x^5$$

$$\begin{aligned} f'(x) &= \cos 5x^5 \cdot 25x^4 \\ &= 25x^4 \cos 5x^5 \end{aligned}$$

$$30) f(x) = \cos 2x^2$$

$$\begin{aligned} f'(x) &= -\sin 2x^2 \cdot 4x \\ &= -4x \sin 2x^2 \end{aligned}$$

$$31) f(x) = (x^5 - 5)\cos 3x^2$$

$$\begin{aligned} f'(x) &= (x^5 - 5) \cdot -\sin 3x^2 \cdot 6x + \cos 3x^2 \cdot 5x^4 \\ &= x(-6x^5 \sin 3x^2 + 30 \sin 3x^2 + 5x^3 \cos 3x^2) \end{aligned}$$

$$32) f(x) = (-x^3 + 5)\sin 4x^5$$

$$\begin{aligned} f'(x) &= (-x^3 + 5) \cdot \cos 4x^5 \cdot 20x^4 + \sin 4x^5 \cdot -3x^2 \\ &= x^2(-20x^5 \cos 4x^5 + 100x^2 \cos 4x^5 - 3 \sin 4x^5) \end{aligned}$$

$$33) f(x) = \frac{\sin 4x^2}{-3x^4 - 2}$$

$$\begin{aligned} f'(x) &= \frac{(-3x^4 - 2) \cdot \cos 4x^2 \cdot 8x - \sin 4x^2 \cdot -12x^3}{(-3x^4 - 2)^2} \\ &= \frac{4x(-6x^4 \cos 4x^2 - 4 \cos 4x^2 + 3x^2 \sin 4x^2)}{(-3x^4 - 2)^2} \end{aligned}$$

$$34) f(x) = \frac{\cos 5x^3}{3x^5 - 4}$$

$$\begin{aligned} f'(x) &= \frac{(3x^5 - 4) \cdot -\sin 5x^3 \cdot 15x^2 - \cos 5x^3 \cdot 15x^4}{(3x^5 - 4)^2} \\ &= \frac{15x^2(-3x^5 \sin 5x^3 + 4\sin 5x^3 - x^2 \cos 5x^3)}{(3x^5 - 4)^2} \end{aligned}$$