Calculus

Chain Rule

Differentiate each function with respect to *x*.

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

2) $f(x) = (x^4 - 3)^{-4}$

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

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

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

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

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

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

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

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

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

12) $f(x) = (x^5 + 5)^{\frac{1}{3}}$

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

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

15) $f(x) = (x^3 + 3)^3$

16) $f(x) = (-4x + 1)^3$

Answers to Chain Rule

1) $f'(x) = 60x^3(3x^4 - 5)^4$

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

3) $f'(x) = 30x^4(3x^5 - 4)$

4) $f'(x) = \dfrac{60x^2}{(-4x^3 - 5)^6}$

5) $f'(x) = -\dfrac{80x^3}{(5x^4 + 3)^5}$

6) $f'(x) = \dfrac{12}{(-3x - 2)^5}$

7) $f'(x) = -\dfrac{20x^4}{(x^5 + 2)^5}$

8) $f'(x) = \dfrac{15x^4}{2(3x^5 - 2)^{\frac{1}{2}}}$

9) $f'(x) = -\dfrac{3}{2(-3x + 1)^{\frac{1}{2}}}$

10) $f'(x) = \dfrac{3x}{2(3x^2 - 2)^{\frac{3}{4}}}$

11) $f'(x) = 20x(5x^2 - 4)$

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

13) $f'(x) = 20x(5x^2 + 4)$

14) $f'(x) = 10x^4(x^5 + 4)$

15) $f'(x) = 9x^2(x^3 + 3)^2$

16) $f'(x) = -12(-4x + 1)^2$