

Find the derivative for the following function:

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1- $f(x) = x^8 \gggggggg f'(x) = 8x^7$

2- $f(x) = 9x^{10} \gggggggg f'(x) = 90x^9$

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

4- $f(x) = x^8 + x + 2 \gggggggg f'(x) = 8x^7 + 1$

5- $f(x) = 3x + 2x \gggggggg f'(x) = 5$

6- $f(x) = \sqrt{x^8} = \frac{8}{2}x^{\frac{8}{2}-1} \gggggggg f'(x) = 4x^3$

7- $f(x) = 7x + 3 \gggggggg f'(x) = 7$

8- $f(x) = \sqrt{x} \gggggggg f'(x) = \frac{1}{2\sqrt{x}}$

9- $f(x) = 3x^5 + \sqrt{x} + 2 \gggggggg f'(x) = 15x^4 + \frac{1}{2}x^{\frac{-1}{2}}$

10- $f(x) = 6x^3 + 2x^2 + 7x - 8 \gggggggg f'(x) = 18x^2 + 4x + 7$

$$11- \quad f(x) = \frac{4}{3x^8} = \frac{4 \cdot -8}{3} x^{-8-1}$$

$$\gggggggg \quad f'(x) = \frac{-32}{3} x^{-8-1} = \frac{-32}{3} x^{-9}$$

$$12- \quad f(x) = 20x^{10} \gggggggg \quad f'(x) = 200x^9$$

$$13- \quad f(x) = x^5 \gggggggg \quad f'(x) = 5x^4$$

$$14- \quad f(x) = \frac{300}{x^7} \gggggggg \quad f'(x) = -2100 x^{-8}$$

$$15- \quad f(x) = 30x^4 \gggggggg \quad f'(x) = 120x^3$$

$$16- \quad f(x) = 1000000 x \gggggggg \quad f'(x) = 1000000$$

$$17- \quad f(x) = 3x^4 \gggggggg \quad f'(x) = 12x^3$$

Example 1 – Applying the Product Rule

Find $F'(x)$.

$$F(x) = (x^2 + 3x)(4x + 5)$$

$$\begin{aligned} F'(x) &= \left(\frac{d}{dx} (x^2 + 3x) \right) (4x + 5) + (x^2 + 3x) \left(\frac{d}{dx} (4x + 5) \right) \\ &= (2x + 3)(4x + 5) + (x^2 + 3x)(4) = 12x^2 + 34x + 15 \end{aligned}$$

Practice for Integration:

1- $f(x) = 7 \ln x$ >>>>>>>> $f'(x) = \frac{7}{x}$

2- $f(x) = e^x$ >>>>>>>> $f'(x) = e^x$

3- $f(x) = 200 e^x$ >>>>>>>> $f'(x) = 200 e^x$

4- $f(x) = 200 e^x + 100x + 8$

>>>>>>>> $f'(x) = 200 e^x + 100$

5- $f(x) = 8 e^x + e^{700} + 30x^4$

>>>>>>>> $f'(x) = 8 e^x + 120x^3$

6- $f(x) = 1000000 x$ >>>>>>>> $f'(x) = 1000000$

7- $f(x) = e^{50} + 70x + \ln 8$ >>>>>>>> $f'(x) = 70$

8- $f(x) = 7 \ln x + 30x$ >>>>>>>> $f'(x) = \frac{7}{x} + 30$

9-

$$f(x) = 3 \ln(x + 2) + 4 \ln(x + 1) + 2 \ln(x - 2)$$

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

10-

$$f(x) = 2x^2 \ln x$$

$$f'(x) = (4x) (\ln x) + \left(\frac{1}{x}\right) 2x^2$$

11- $f(x) = e^{7x^2+x+80} + 90x + 99$

>>>>>>> $f'(x) = e^{7x^2+x+80}(14x + 1) + 90$

12- $f(x) = \ln x^{10}$

»»»»»»» $f'(x) = \frac{10}{x}$

13- $f(x) = -x + x^3$ »»»»»»» $f'(x) = -1 + 3x^2$

14- $f(x) = 81e^{50} + x + \ln \sqrt{95}$ »»»»»»» $f'(x) = 1$

15- $f(x) = \frac{1}{\sqrt{x}}$ »»»»»»» $f'(x) = \frac{-1}{2} x^{\frac{-3}{2}}$

16- $f(x) = \left(\frac{4}{7}\right)^{\frac{9}{5}}$ »»»»»»» $f'(x) = \text{zero}$

17- $f(x) = \frac{4}{7} x^7$ »»»»»»» $f'(x) = 4x^6$

$y = x^5 + x^4 + x^3 + x^2 + x + 1 \rightarrow y'''$

$y' = 5x^4 + 4x^3 + 3x^2 + 2x + 1$

$y'' = 20x^3 + 12x^2 + 6x + 2$

$y''' = 60x^2 + 24x + 6$

Find the value of integration for the following function:

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$$1 - f(x) = \int 7 dx = 7x + c$$

$$2 - f(x) = \int 2x + 1 dx = \frac{2x^2}{2} + x + c$$

$$3 - f(x) = \int 70x + x + 9 dx = \frac{70x^2}{2} + \frac{x^2}{2} + 9x + c$$

$$4 - f(x) = \int \frac{1}{\sqrt{x}} dx = 2\sqrt{x} + c$$

$$5 - f(x) = \int \frac{1}{7x^5} dx = \frac{7x^{-4}}{-4} + c$$

$$6 - f(x) = \int \frac{5}{x^7} dx = \frac{-5}{6x^6} + c$$

$$7 - f(x) = \int \int \frac{1}{t^4} dt = -\frac{4}{3x^4} + c$$

$$8 - f(x) = \int 40x + 3x + 99 dx = \frac{40x^2}{2} + \frac{3x^2}{2} + 99x + c$$

$$9 - f(x) = \int (e^x + 3x^2 + 2x) dx = e^x + x^3 + x^2 + c$$

$$10 - f(x) = \int x^3(x^2 + 5x + 2) dx = \frac{x^6}{6} + x^5 + \frac{x^4}{2} + c$$

$$11 - f(x) = \int \frac{x^4 - 5x^2 + 2x}{5x^2} dx = \frac{1}{5} \left(\frac{x^3}{3} - 5x + 2\ln x \right) + c$$

$$12 - y' = \frac{9}{8\sqrt{x}} \quad \text{Condition: } y(16) = 10$$

Solution: $y = \frac{9\sqrt{x}}{4} + 1$

13 - $y' = -x^2 + 2x$ $y(2) = 1$

Solution: $y = \frac{9\sqrt{x}}{4} + 1$

14 - $f(x) = \int e^{58379} dx = e^{58379}x + c$

15 - $f(x) = \int 2x(x^2 + 3)^5 dx = \frac{(x^2+3)^6}{6} + c$

16 - $f(x) = \int_0^3 5 dx = 15$

17 - $f(x) = \int_2^8 -5x dx = -150$

18 - $f(x) = \int_{-3}^1 (2x - 3) dx = -20$