PINFOSS 22
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Calculus.vk38

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18.
a)

$$f(x) = \sqrt{x}$$

$$\begin{aligned} f'(x) &= D[\ \sqrt{1}\ ] \\ &= \frac{1}{2\sqrt{1}} \\ &= \frac{1}{2} \end{aligned}$$

b)

$$f(x) = 4\sqrt[3]{x}$$

$$\begin{aligned} f'(x) &= D[\ 4\ ]\ D[\ \sqrt[3]{2}\ ] \\ &= \frac{1}{3\sqrt[3]{2^2}} \end{aligned}$$

25.

a)

$$a(x) = xcos(x)$$

$$\begin{aligned} a'(x) &= D[x]\ cos(x) + x\ D[cos(x)] \\ &= cos(x) - xsin(x) \end{aligned}$$

b)

$$b(x) = \frac{2x}{x+3}$$

$$\begin{aligned} b'(x) &= \frac{2x}{x+3} \\ &= \frac{D[\ 2x\ ]x + 3 - 2xD[\ x+3\ ]}{(x+3)^2} \\ &= \frac{2x+6-2x}{(x+3)^2} \\ &= \frac{6}{(x+3)^2} \end{aligned}$$

c)

$$c(x) = x^2 INx$$

$$\begin{aligned} c'(x) &= x^2 INx \\ &= D[\ x^2\ ]INx + x^2 D[\ INx\ ] \\ &= 2xInx + x \end{aligned}$$

d)

$$d(x) = \frac{sin(x)}{x}$$

$$d'(x) = \frac{sin(x)}{x}$$

$$\begin{aligned} &= \frac{D[sinx(x)]x - sin(x)D[\ x\ ]}{x^2} \\ &= \frac{xcos(x) - sin(x)}{x^2} \end{aligned}$$

26.

a)

$$a(x) = 2xsin(3x)$$

$$\begin{aligned} a'(x) &= 2xsin(3x) \\ &= D[\ 2x\ ]sin(3x) + 2xD[sin(3x)] \\ &= 2sin(3x) + 6xcos(3x) \end{aligned}$$

b)

$$b(x) = \frac{x^2}{sin(x)}$$

$$\begin{aligned} b'(x) &= \frac{D[\ x^2\ ]sin(x) - x^2D[sin(x)]}{sin^2(x)} \\ &= \frac{2xsin(x) - x^2cos(x)}{sin^2(x)} \end{aligned}$$

c)

$$c(x) = 3x^2e^{2x}$$

$$\begin{aligned} c'(x) &= D[\ 3x^2\ ]e^{2x} + 3x^2D[\ e^{2x}\ ] \\ &= 6xe^{2x} + 6x^2e^{2x} \\ &= 6xe^2(x + x^2) \end{aligned}$$

d)

$$d(x) = \frac{x}{2x^2 + 1}$$

$$\begin{aligned} d'(x) &= \frac{D[\ x\ ]2x^2 + 1 - x\ D[\ 2x^2 + 1\ ]}{(2x^2 + 1)^2} \\ &= \frac{1 - 2x^2 - 4x^2}{(2x^2 + 1)^2} \\ &= \frac{1 - 2x^2}{(2x^2 + 1)^2} \end{aligned}$$

23.

a)

$$f(x) = e^{5x}$$

$$\begin{aligned} f'(x) &= D[e^{5x}] \;\; D[\ 5x\ ] \\ &= 5e^{5x} \end{aligned}$$

b)

$$f(x) = sin(100x + 0,1)$$

$$\begin{aligned} f'(x) &= D[sin(100x + 0,1)] \\ &= 100cos(100x + 0,1) \end{aligned}$$

c)

$$f(x) = e^{-x^2}$$

$$\begin{aligned} f'(x) &= D[\ e^{-x^2}\ ] \;\; D[\ -x^2\ ] \\ &= -2xe^{-x^2} \end{aligned}$$

d)

$$n(t) = 3e^{-2t} - 2e^{-5t}$$

$$\begin{aligned} n'(t) &= D[\ 3e^{-2t}\ ] - 2e^{-5t} + 3e^{-2t}D[\ -2e^{-5t}\ ] \\ &= -6e^{-2t} + 10e^{-5t} \end{aligned}$$

e)

$$f(t) = 3sin(4t) - 7cos(4t)$$

$$\begin{aligned} f'(t) &= D[\ 3sin(4t)\ ]\ D[\ -7cos(4t)\ ] \\ &= 12cos(4t) - 28sin(4t) \end{aligned}$$

27.

a)

$$y = (3x^2 + 1)^4$$

$$\begin{aligned} y' &= D[\ 3x^2 + 1\ ]\ D[u^4] \\ &= 24x(3x^2 + 1)^3 \end{aligned}$$

b)

$$y = sin^3 x$$

$$\begin{aligned} y' &= D[\ sinx\ ]D[\ u^3\ ] \\ &= 3sin^2 + cos^3 x \end{aligned}$$

c)

$$y = \sqrt{5x^2 + 2}$$

$$\begin{aligned} y' &= D[\sqrt{5x^2 + 2}]\ D[5x^2 + 2] \\ &= 10x\frac{1}{2\sqrt{5x^2 + 2}} \\ &= \frac{2 \times 5x}{2\sqrt{5x^2 + 2}} \\ &= \frac{5x}{\sqrt{5x^2 + 2}} \end{aligned}$$