

(1) Differentiate the following functions.

(a) $f(x) = x^5 \cos x$.

(b) $u = (2x + 1)5^x$

(c) $g(s) = s^{\frac{5}{3}} - 2se^s$

(d) $y = \frac{1}{x^3 + 3x + 1}$

(e) $y = \frac{4}{e^t + 1}$

(f) $w = \frac{x}{x^2 + 2}$

(2) Find the tangent line at the indicated point.

(a) $y = xe^x - 1$ at $x = 0$

(b) $y = x \ln x$ at $x = 1$

(3) Differentiate

(a) $h(x) = \sin x^2$

(b) $y = (x^2 + x + 1)^7$

(c) $w = \sqrt{4t + 1}$

(d) $w = \sqrt{\sin t}$

(e) $h(t) = (x + 1)^{\frac{4}{5}}$.

$$(f) f(x) = \frac{1}{(x^4 - 5x + 7)^2}$$

(4) Differentiate the following functions.

$$(a) g(t) = (t - 1)^8$$

$$(b) h(t) = (t^2 + t + 1)^{17}$$

$$(c) h(t) = \left(t + \frac{1}{t}\right)^{\frac{1}{4}}$$

$$(d) \ell(x) = \sin \frac{1}{x}$$

$$(e) m(x) = e^x \sin x$$

$$(f) n(x) = (3x^4 + 5x^3 + 6x)^{45}$$

$$(g) m(x) = \sqrt[5]{4x^3 + \pi x^2 + 4}$$

$$(h) j(x) = \left(e^x + \frac{1}{x^2}\right)^{\sqrt{7}}$$

$$(i) f(x) = \ln(x^3 - x + 9)$$

$$(j) f(x) = \ln(e^x + 1)$$

$$(k) u(x) = x \arctan x$$

$$(l) v(x) = \arctan(x + 1)$$