

1. Differentiate each of the following functions with respect to x .

(a) $f(x) = (x + \pi)^3$.

(b) $g(x) = e^{(x^2 + \ln(x))}$.

(c) $r(x) = \ln(\arctan(x^2))$.

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

(e) $f(x) = x^{\sin(x)}$.

2. Find the equation of the line tangent to the ellipse $2x^2 + 3y^2 = 11$ at the point $(2, 1)$.

3. If $\sin(y) = \cos(x)$, what is $\frac{dy}{dx}$?

4. Circle True or False for each question.

(a) True False $V = 2^{\log_2(V)}$ for every positive integer V .

(b) True False $\arctan(1) = \frac{\pi}{4}$.

(c) True False $\frac{d}{dx}(\sqrt{x+y}) = \frac{d}{dx}(\sqrt{x}) + \frac{d}{dx}(\sqrt{y})$ for every positive integer y .

(d) True False $f(x) = \pi x^3 - 2^\pi x^6$ is not differentiable at $x = \pi - 2^\pi$.

(e) True False If n is divisible by 4, then the n -th derivative of $\sin(x)$ with respect to x is $\cos(x)$.

(f) True False $\pi = \frac{7^7}{4^9}$.

(g) True False $\sqrt{x+y} = \sqrt{x} + \sqrt{y}$ for all non-negative real numbers x and y with $x+y=0$.

(h) True False $\frac{d}{dy}(y^y) = yy^{y-1}$.

(i) True False The correct answer to this question is neither 'True' nor 'False'.