

Instructions: Write your work up neatly and attach to this page. Record your final answers (only) directly on this page if they are short; if too long indicate which page of the work the answer is on and mark it clearly. Use exact values unless specifically asked to round.

1. Find the derivative of the function.

a. $y = \frac{3}{4}e^x + 2 \cos x$

b. $g(x) = \frac{\sin x}{e^x}$

c. $g(t) = \sqrt[4]{t} + 6 \csc t$

d. $h(x) = 2 \sin x \cos x$

e. $y = \sqrt{3}x + 2 \cos x$

f. $h(x) = \sqrt{x} \sin x$

g. $y = \frac{\sec x}{x}$

h. $y = 2x \sin x + x^2 e^x$

2. Find the second derivative of the function.

a. $y = \tan x$

b. $y = x \cos x + \cot x$

3. Find the derivative of the function.

a. $f(x) = (4x - 1)^3$

b. $g(x) = \frac{x}{\sqrt{x^2+1}}$

c. $y = \sqrt{\frac{1}{t^2-2}}$

d. $h(x) = [(x^2 + 3)^5 + x]^2$

e. $f(s) = e^{-s} \ln s$

f. $q(x) = 4^x$

g. $y = \log_3(x)$

h. $y = \sin(\cos x)$

i. $y = \sqrt[3]{6x^2 + 1}$

j. $y = \frac{1}{2}x^2 \sqrt{16 - x^2}$

k. $g(t) = \left(\frac{3t^2-1}{2t+5}\right)^3$

l. $f(\theta) = \tan^2 5\theta$

m. $y = e^{\sqrt{x}}$

n. $s(t) = t^2 2^t$

o. $h(t) = \ln\left(\frac{x}{x^2+1}\right)$

4. Find $\frac{dy}{dx}$ implicitly.

a. $x^2 - y^2 = 25$

b. $\sin x + 2 \cos 2y = 1$

c. $\ln(xy) + 5x = 30$

d. $x^2y + y^2x = -3$

e. $\cot y = x - y$

f. $\tan(x + y) = x$

5. Find an equation of the tangent line to the graph $x^2 + xy + y^2 = 4$ at the point (2,0).

6. Find $\frac{d^2y}{dx^2}$ for $1 - xy = x - y$.

7. Use logarithmic differentiation to find $\frac{dy}{dx}$.

a. $y = \frac{x(x-1)^{3/2}}{\sqrt{x+1}}$

b. $y = (1+x)^{1/x}$

c. $y = x^{2/x}$

d. $y = x^{\ln x}$

8. Find the derivative of the function.

a. $y = \arctan e^x$

b. $f(x) = e^{2x} \operatorname{arcsec} 3x$

c. $g(x) = \frac{\arccos x}{x+1}$