

1. Differentiate the following functions (DO NOT SIMPLIFY FINAL ANSWER)

(a) $f(x) = \ln(\tan x)$

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

(c) $f(x) = \frac{x^4\sqrt{3x-1}}{x-1}$ (Logarithmic Differentiation)

(d) $f(x) = e^{x^2 \cos(x)}$

2. Evaluate the integral

(a) $\int \frac{\tan(\ln x)}{x} dx$

(b) $\int_0^1 e^x(1 - e^x)^2 dx$