

1. Differentiate the following functions:

(a) $f(x) = \sqrt{x^2 + 1}$.

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

(c) $h(x) = e^x \tan^{-1}(x)$.

2. Find the general antiderivative, $F(x)$, of for $f(x) = \frac{4}{x} - \frac{2}{1+x^2} + 3 \cos x - \sqrt{x^3}$.

3. (For any hotshots in the class, but **don't worry if you cannot do these problems yet!**)

(a) Let $f(x)$ be a differentiable function. Compute $\int \frac{\ln(f(x))f'(x)}{f(x)} dx$.

(b) Compute $\int_2^\infty \frac{\ln x}{x^4} dx$.