

7. (14 points) Show your work!

(a) Confirm that

$$F(x) = \frac{1}{4}x^4 \ln(x) - \frac{1}{16}x^4 + 12$$

is an antiderivative for $f(x) = x^3 \ln(x)$, for values of $x > 0$. Show your work.

(b) Use the Fundamental Theorem of Calculus to find $\int_1^2 x^3 \ln(x) dx$. Give your answer in *exact form*—i.e., not a decimal approximation.

(c) Find an equation of the tangent to the graph of F at $x = 1$.