Math 180 / David Dumas / Fall 2014

Solution and Rubric for Quiz 8 (Mon Oct 19)

Problem: Compute the derivative of

$$\frac{1}{\ln \frac{1}{x}}.$$

Solution: It is helpful to notice that $\ln \frac{1}{x} = -\ln x$. Using the chain rule we have

$$\begin{aligned}
\frac{d}{dx}\left(\frac{1}{\ln \frac{1}{x}}\right) &= \frac{d}{dx}\left(\frac{-1}{\ln x}\right) \\
&= -\frac{d}{dx}(\ln x)^{-1} \\
&= -\left(-(\ln x)^{-2}\,\frac{d}{dx}(\ln x)\right) \\
&= (\ln x)^{-2}x^{-1} \\
&= \frac{1}{x(\ln x)^2}
\end{aligned}$$

It is also possible to use the quotient rule, or to do the entire problem without simplifying $\ln \frac{1}{x}$.

Rubric:

- If the final answer is correct, and is supported by clear and correct work: $\boxed{\text{2 points}}$
- If the only mistake is an overall sign error, but the chain rule and/or quotient rule are applied correctly except for that overall sign: $\boxed{\text{1 point}}$
- Otherwise: $\boxed{\text{0 points}}$