Math 220 Section AD8/Math 199 Quiz 2

* Each quiz either had a or b or c from each question.

1. In each of the following solve for $x$

(a) $\ln(\ln(2^x)) = 1$

\[
\begin{align*}
\ln(\ln(2^x)) &= 1 \\
e^{\ln(\ln(2^x))} &= e^1 \\
\ln(2^x) &= e \\
x \ln(2) &= e \\
x &= e/\ln(2)
\end{align*}
\]

(b) $3^{\ln x^2} = 10$

\[
\begin{align*}
3^{\ln x^2} &= 10 \\
\log 3^{\ln x^2} &= \log 10 \\
\ln x^2 \log 3 &= 1 \\
2 \ln x \log 3 &= 1 \\
\ln x &= \frac{1}{2 \log 3} \\
e^{\ln x} &= e^{\frac{1}{2 \log 3}} \\
x &= e^{\frac{1}{2 \log 3}}
\end{align*}
\]
2. Express the given quantity as a single logarithm

(a) \[3 \log(a) + \frac{1}{3} \log(a^2 - 3)^3\]

(b) \[-\ln(y + y^2) + 4 \ln(3^{1/2})\]

3. True or False?

(a) \[\arccos(\cos(\pi/2)) = \arccos(\cos(3\pi/2))\]

True
This is true since \(\cos(\pi/2) = \cos(3\pi/2) = 0\) and \(\arccos(0) = \arccos(0) = \pi/2\)

(b) \[\tan^{-1}(-1) = 3\pi/4\]

False
This is false because \(3\pi/4\) is out of the range of \(\tan^{-1} \theta\) which is \((-\pi/2, \pi/2)\)

(c) \[\tan^{-1}(x) = \frac{\sin^{-1}(x)}{\cos^{-1}(x)}\]

False!
An inverse function \(f^{-1}(x) \neq \frac{1}{f(x)}\)