Derivatives of Logarithmic Functions

Solutions should show all of your work, not just a single final answer.

1. Compute dy/dx, using logarithmic differentiation for parts c through e. Write your final answers entirely in terms of x.

   (a) $y = \ln(2 + \sin x)$
   (b) $y = \ln(\ln x)$
   (c) $y = 5^x$
   (d) $y = x^{\cos x}$
   (e) $y = x^{2x}$
   (f) $y = (x + 1)^x$

2. T/F (with justification) If $f(x) = \ln(x^2)$ for all $x > 0$ then $f'(x) = \dfrac{1}{x^2}$.

3. T/F (with justification) If $f(x) = 10^x$ for all x then $f'(x) = x10^{x-1}$.