EE2150 Quiz 1, Fall 2000

1. Given \( A = (\sqrt{3} - j3)^{1/3} \), express \( A \):
   
   (a) in Cartesian form \((x + jy)\)
   
   \[
   A = \left[ \sqrt{3} + 9 \exp^{j \tan^{-1} \frac{-3}{\sqrt{3}}} \right]^{1/3} 
   = 12^{1/6} \exp^{-j60^\circ/3} 
   = 1.5131 \exp^{-j20^\circ} \text{ (only 1 root of 3)} 
   = 1.4218 - j0.5175
   \]

   (b) in polar form \((re^{j\theta})\).
   
   \[
   A = 1.5131 \exp^{-j20^\circ} \text{ (only 1 root of 3)}
   \]

2. Given that \( f(x) = \sin(ax) \), find:
   
   (a) \( \int f(x)dx = -\frac{\cos ax}{a} + \text{constant} \)
   
   (b) \( \frac{df(x)}{dx} = a \cos ax \)
   
   (c) The value of \( x \) which maximizes \( f(x) \) (show work for full credit)
   
   Set \( \frac{df(x)}{dx} = 0 \). Then \( a \cos ax = 0 \) or \( x = \pm \frac{n\pi}{2a} \), where \( n = 1, 3, 5, \ldots \)