Solutions to Homework Assignment 15

MATH 345-01

Section 33, Page 95

1,2,3,8,9

1. (a) $\text{Log}\,(-ei) = \ln|-ei| - i\pi/2 = 1 - i\pi/2$.

   (b) $\text{Log}\,(1-i) = \ln(\sqrt{2}) - i\pi/4 = \dfrac{1}{2}\ln 2 - \dfrac{\pi}{4}i$.

2. (a) $\log e = \ln e + i(2n\pi) = 1 + 2n\pi i$.

   (b) We did this in class.

   (c) $\log(-1+\sqrt{3}i) = \ln 2 + i(\pi/3 + 2n\pi) = \ln 2 + 2i\left(\dfrac{1}{3} + n\right)\pi$.

3. $\text{Log}(i^3) = \text{Log}(-i) = -\pi/2$, while $3\text{Log}(i) = 3\pi/2$. These are the same direction (down the negative imaginary axis), but not the same number.

8. If $\log z = i\pi/2$, then $e^{\log z} = e^{i\pi/2}$, so $z = i$.

9. We did this in class.