AP Precalculus - M3Y & M3Z
Trigonometry - Homework 2

1. Prove the following identities:

   (i) $\csc\theta\cos\theta\tan\theta = 1$

   (ii) $\dfrac{\sec\theta}{\tan\theta} = \csc\theta$

   (iii) $\csc^2\theta - \cot^2\theta = 1$

   (iv) $\dfrac{1+\cot\varphi}{\csc\varphi} = \sin\varphi + \cos\varphi$

   (v) $\dfrac{\cos^2 a}{1+\sin a} = 1 - \sin a$

   (vi) $\dfrac{\cos\theta}{1+\sin\theta} = \dfrac{1-\sin\theta}{\cos\theta}$

   (vii) $\sin(\theta+\varphi)\sin(\theta-\varphi) = \sin^2\theta - \sin^2\varphi$

   (viii) $\dfrac{\sin^2(-x) - \cos^2(-x)}{\sin(-x) - \cos(-x)} = \cos x - \sin x$

2. Convert the following polar coordinates to cartesian coordinates:

   (i) $\left(3, \dfrac{5\pi}{6}\right)$

   (ii) $\left(-1, \dfrac{3\pi}{2}\right)$

   (iii) $\left(\sqrt{3}, \dfrac{\pi}{6}\right)$

   (iv) $\left(6, \dfrac{-\pi}{3}\right)$

   (v) $\left(2, \dfrac{5\pi}{4}\right)$

   (vi) $\left(8, \dfrac{7\pi}{3}\right)$

3. Convert the following cartesian coordinates to polar:

   (i) $(2, 5)$

   (ii) $(-3, 6)$

   (iii) $(10, -9)$

   (iv) $(-3, -4)$

   (v) $(0, 7)$

   (vi) $(9, 0)$

   (vii) $(0, -2)$

   (viii) $(-1, 0)$

4. Find the polar form of the following complex numbers:

   (i) $2 + 5i$

   (ii) $-3 + 6i$

   (iii) $10 - 9i$

   (iv) $-3 - 4i$

   (v) $7i$

   (vi) 9

   (vii) $-2i$

   (viii) -1