

Solution (#80) Writing $t = \tan \theta$ we have

$$\tan 7\theta = \frac{7t - 35t^3 + 21t^5 - t^7}{1 - 21t^2 + 35t^4 - 7t^6}.$$

The six roots of equation $x^6 - 21x^4 + 35x^2 - 7 = 0$ are

$$\pm \tan \frac{\pi}{7}, \quad \pm \tan \frac{2\pi}{7}, \quad \pm \tan \frac{3\pi}{7}.$$