Problem 1

(11 points)

a)* Show that

$$\frac{\sin\omega}{1+\cos\omega} = \tan\frac{\omega}{2}.$$

b)* Given are the following pole positions

$$s_k = 1000\pi e^{j\pi/2} e^{j(3k+1)\pi/14} \quad k = 0, \ldots, 6$$

Write down the transfer function $H(s)$

c) Plot the magnitude response of $H(s)$

d) Plot the pole-zero plot of $H(s)$ **Hint:** You can use the ”pzmap” command of MATLAB. You may hand in a print of the plots or draw them by hand. In this case make sure that they are labled properly.

e)* Find the all the roots of the following equation

$$x = (-1)^{1/3}\,.$$