

Problem 1

(11 points)

a)* Show that

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

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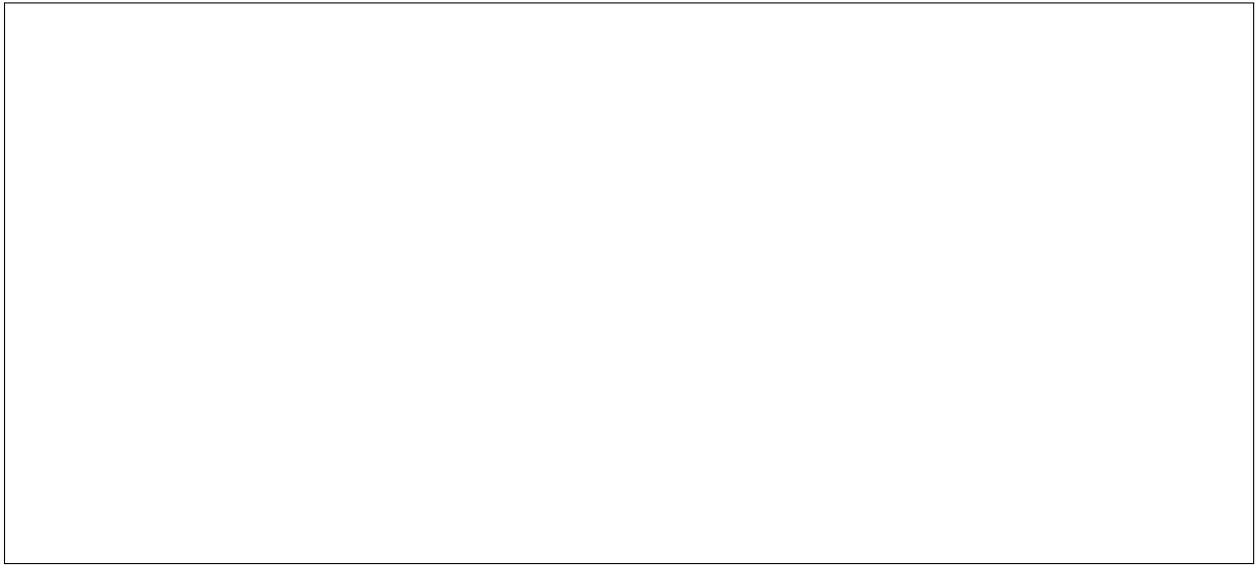
b)* Given are the following pole positions

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

Write down the transfer function $H(s)$ ☐c) Plot the magnitude response of $H(s)$ ☐

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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 labeled properly.

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

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

