1. Given $H(s) = \frac{v_o(s)}{v_i(s)} = \frac{10^4}{s+10^3}$

   a) Calculate the steady-state sinusoidal output $v_o(t)$ when $v_i(t) = 1 + \cos(100t) + \cos(1000t) + \sin(10000t)$.

   b) Repeat part a) if $H(s) = -\frac{10^4}{s+10^3}$.

2. Sketch the Bode plots (magnitude and phase) of the following transfer functions.

a) $H(s) = \frac{10^5}{s+10^3}$.

b) $H(s) = \frac{10^5 s}{s+10^3}$.

c) $H(s) = -\frac{10^5}{s(s+10^3)}$.

d) $H(s) = \frac{10^5}{(s+10^3)^2}$.

e) $H(s) = \frac{10^7}{(s+10^2)(s+10^4)}$.

f) $H(s) = \frac{10^4(s+10^3)}{(s+10^2)(s+10^4)}$.

g) $H(s) = \frac{-10^4(s+10^2)}{(s+10^3)(s+10^4)}$.

3. Given the Bode plots (magnitude and phase) of $H(s) = \frac{v_o(s)}{v_i(s)}$, find $v_i(t)$ if $v_o(t) = \cos(10t) + \cos(10^3 t) + \cos(10^5 t) + \cos(10^6 t)$.