Problem 1: The transfer function of a plant and its bode diagram are given below.

\[ G(s) = \frac{s^3 + 9s^2 + 3}{s^5 + 2s^4 + 3s^3 + 4s^2 + 5s + 6} \]

Determine the steady state response of the plant for the given input using bode diagram.

\[ x(t) = [9\sin(0.5t + 0.1903) + 3\cos(9t + 1.903)]h(t) \]

Note that the phase angles are in radians.
**Problem 2:** The transfer function of a system is as follows

\[ G(s) = \frac{200(s + 20)}{s(2s + 1)(s + 40)} \]

a) Draw the Bode diagrams of the system, both magnitude and phase, by hand, using the broken line approximation.

b) Verify your results by using MATLAB’s built-in function ‘bode()’.

**Problem 3:** Using straight line approximation and first order factors determine the transfer function of the system, whose frequency response is given below.