Solution of ECE 315 Test 12 F06

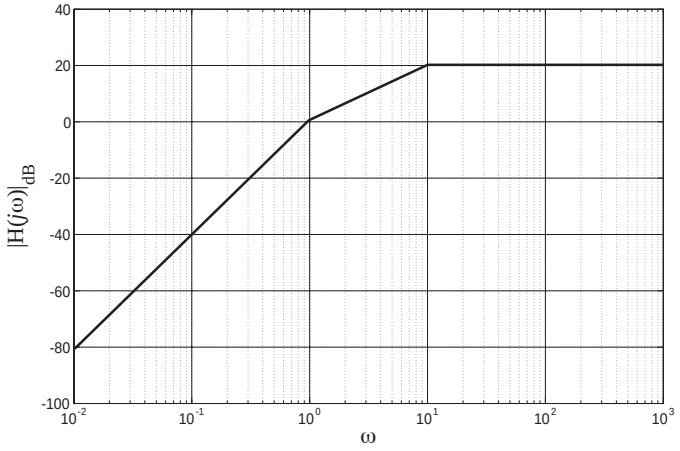
1. A system has a transfer function $\mathrm{H}(j\omega) = 10\dfrac{(j\omega)^2}{(j\omega)^2 + j11\omega + 10}$.

(a) Find the numerical values of its transfer function magnitude in dB and its transfer function angle in radians at these frequencies.

$\omega = 0.01$	$\lvert\mathrm{H}(j\omega)\rvert_{\mathrm{dB}} = -80$	$\measuredangle\mathrm{H}(j\omega) = 3.1306$ radians
$\omega = 1$	$\lvert\mathrm{H}(j\omega)\rvert_{\mathrm{dB}} = -3.0535$	$\measuredangle\mathrm{H}(j\omega) = 2.2565$ radians
$\omega = 10$	$\lvert\mathrm{H}(j\omega)\rvert_{\mathrm{dB}} = 16.9465$	$\measuredangle\mathrm{H}(j\omega) = 0.8851$ radians
$\omega = 1000$	$\lvert\mathrm{H}(j\omega)\rvert_{\mathrm{dB}} = 20$	$\measuredangle\mathrm{H}(j\omega) = 0.011$ radians

$$\mathrm{H}(j\omega) = 10\frac{(j\omega)^2}{(j\omega)^2 + j11\omega + 10} = 10\frac{(j\omega)^2}{(j\omega+1)(j\omega+10)} = \frac{(j\omega)^2}{(1+j\omega)(1+j\omega/10)}$$

(b) Draw the overall asymptotic magnitude Bode Diagram for this transfer function in the space below.



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(a) Find the numerical values of its transfer function magnitude in dB and its transfer function angle in radians at these frequencies.

$\omega = 0.01$	$\lvert\mathrm{H}(j\omega)\rvert_{\mathrm{dB}} = -40$	$\measuredangle\mathrm{H}(j\omega) = 1.5598$ radians
$\omega = 1$	$\lvert\mathrm{H}(j\omega)\rvert_{\mathrm{dB}} = -3.0535$	$\measuredangle\mathrm{H}(j\omega) = 0.6587$ radians
$\omega = 10$	$\lvert\mathrm{H}(j\omega)\rvert_{\mathrm{dB}} = -3.0535$	$\measuredangle\mathrm{H}(j\omega) = -0.6857$ radians
$\omega = 1000$	$\lvert\mathrm{H}(j\omega)\rvert_{\mathrm{dB}} = -40$	$\measuredangle\mathrm{H}(j\omega) = -1.5598$ radians

$$\mathrm{H}(j\omega) = 10\frac{(j\omega)^2}{(j\omega)^2 + j11\omega + 10} = 10\frac{(j\omega)^2}{(j\omega+1)(j\omega+10)} = \frac{(j\omega)^2}{(1+j\omega)(1+j\omega/10)}$$

(b) Draw the overall asymptotic magnitude Bode Diagram for this transfer function in the space below.