
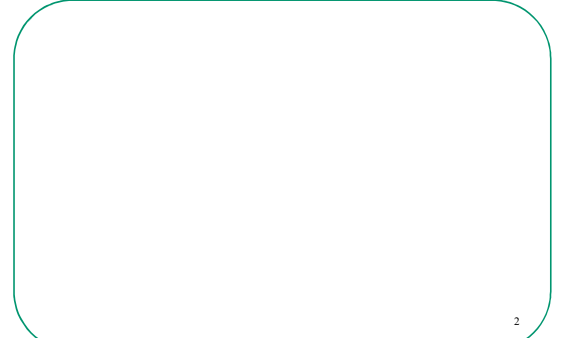


Find A and ϕ for $w=1$ and 4

$$\frac{dy}{dt} + 3y = \sin \omega t \Rightarrow y = A \sin(\omega t + \phi)$$


1

Find the gain and phase in terms of w and hence find $y(t)$ when $Y(s)=G(s)U(s)$ for $w=6$ with $G(s)=8/(s+7)$



2

$$G(s) = \frac{4}{s+0.3} \Rightarrow y(t) = A \cos(\omega t + \phi)$$

$$u(t) = \cos(0.1\sqrt{3} t)$$

3

Given $G(s)=3/(s+2)$, find $y(t)$ for the following $u(t)$.

$$G(s) = \frac{3}{s+2} \Rightarrow G(j\omega) =$$

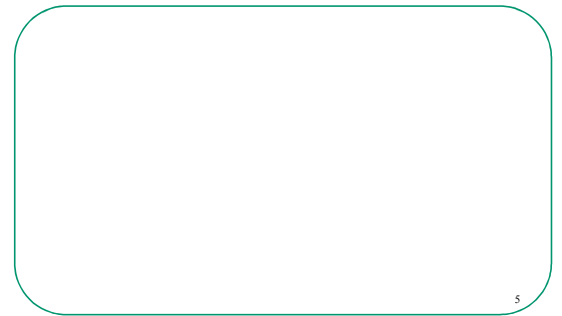
$$u(t) = \sin(2t) \Rightarrow$$

$$u(t) = \cos(4t) \Rightarrow$$

$$u(t) = 2.8 \Rightarrow$$

4

Given $G(s)=2(0.5+s)/(2+s)$, find the gain and phase for $w=4$.



5

Find the gain and phase

NOTE: Integrators have a fixed argument of $\pi/2$

$$G(s) = \frac{(s+2)}{(s+3)}$$

$$G(s) = \frac{(s+2)}{(s+3)(s+4)}$$

$$G(s) = \frac{(s+1)(s+2)}{(s+3)(s+4)}$$

$$G(s) = \frac{4}{s(s+4)}$$

6

By first plotting the argand diagram for each factor, find the phase for:

$$(s-2)$$

$$\frac{1}{s-1}$$

$$(2-s)$$

$$\frac{s-1}{3-s}$$

7

Given $G(s)$ and a sinusoidal input signal $u(t)$ whose amplitude is 1 and frequency is 2(rad/s).

$$G(s) = \frac{5}{1+0.5s}$$

- Compute the corresponding steady-state output $y(t)$.
- What is the gain and phase of the process at this frequency?
- What is the gain and phase for frequencies of 4, 6, 8 and 10 rad/s. Sketch how the gain and phase depend upon frequency.

Repeat the above with the following examples:

$$G(s) = \frac{(s+1)}{(s+4)(s+2)}; \quad G(s) = \frac{3}{(s+10)(s+1)(s+3)}; \quad G(s) = \frac{1}{s(s+1)}$$

8