

- ① Consider an LTI system with unit impulse response  $h(t) = u(t)$ . Is the system BIBO stable?

4 points

Solution:

$$\text{As } \int_{-\infty}^{\infty} |h(t)| dt = \int_{-\infty}^{\infty} |u(t)| dt = \int_0^{\infty} 1 \cdot dt = t \Big|_0^{\infty} = \infty$$

the system is not BIBO stable.

- ② Is the system is given by the impulse response  $h(t) = \frac{1}{t} u(t-T)$  BIBO stable? Does the value of  $T$  affect your answer?

$$\int \frac{1}{t} dt = \ln(t) + C$$

6 points

Solution

$$\int_{-\infty}^{\infty} |h(t)| dt = \int_{-\infty}^{\infty} \left| \frac{1}{t} u(t-T) \right| dt$$

$$= \int_T^{\infty} \frac{1}{t} dt = \ln(\infty) - \ln(T)$$

which is not finite for any value of  $T$ .

Hence the system is not BIBO stable and no such value of  $T$  exists that can make the system BIBO stable.