Homework 4 (Signals and Linear Systems)

Problems from Textbook

2.22 b), f)

2.23 a), d)

2.29

Problem 2.28   An LTI system has an impulse response given by $h(t) = 2\cos(t)\,u(t)$. Obtain the response to input $x(t) = 2\cos(t)\,u(t)$ and determine whether or not the system is BIBO-stable.

Solution: This problem shows how complex exponentials can make solutions to problems easier.
   The response is

$$[2\cos(t)\ u(t)] * [2\cos(t)\,u(t)]$$
$$= [e^{jt} + e^{-jt}]\,u(t) * [e^{jt} + e^{-jt}]\,u(t)$$
.

Show that the response is given by the expression below, and determine whether or not the system is BIBO stable

$$= \boxed{[2t\cos(t) + 2\sin(t)]\,u(t).}$$