EE103 Fall 2017 HW10

1.

7.30. You are given a system with impulse response $h(t) = e^t u(t)$.

(a) Is the system bounded-input bounded-output stable?

(b) You now hook the system up into a *feedback* system, as shown in Figure P7.30. Find the new system transfer function from the input $x(t)$ to the output $y(t)$.

(c) Finally, find the range of the parameter A such that the system is bounded-input bounded-output stable.

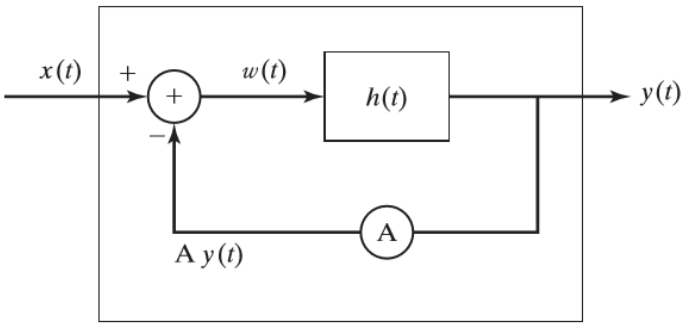

Figure P7.30

2.

7.24. Find the inverse Laplace transform of the function

$$F(s) = \frac{s + 9}{s(s + 1)}$$

for the following regions of convergence:

(a) $\text{Re}(s) < -1$

(b) $\text{Re}(s) > 0$

(c) $-1 < \text{Re}(s) < 0$

(d) Give the final values of the functions of parts (a), (b), and (c).

3.

7.20. **(a)** You are given a linear, time-invariant (LTI) system that produces an output $y(t) = e^{-bt}u(t)$ to an input $x(t) = e^{-at}u(t)$, where $a > 0$ and $b > 0$. Find the impulse response $h(t)$ of the system.

(b) You are given a linear, time-invariant (LTI) system that produces an output $y(t) = e^{-at}cos(bt)u(t)$ to an input $x(t) = u(t)$, where $a > 0$ and $b > 0$. Find the impulse response $h(t)$ of the system.