Assignment 3

Due: Oct 20, 12:00 AM

1. Consider the following signal x(t) and y(t) defined as:

x(t) = \begin{cases} t, & 0 \leq t < 1 \\ 0, & 1 \leq t < 2 \\ 2 - t, & 2 \leq t < 3 \\ 0, & \text{otherwise} \end{cases}

y(t) = \begin{cases} t^2, & 0 \leq t < 1 \\ 0, & 1 \leq t < 2 \\ t - 1, & 2 \leq t < 3 \\ 0, & \text{otherwise} \end{cases}

Find the convolution of x(t) and y(t) for 0 \leq t < 3.

2. Consider the signal u(t) = \begin{cases} 1, & t \geq 0 \\ 0, & t < 0 \end{cases}

Find the derivative of u(t) for t > 0.

3. Consider the signal x(t) = e^{-at} u(t), where u(t) is the unit step function and a > 0.

Find the Laplace transform of x(t).

4. Consider the signal x(t) = \cos(2\pi t) u(t).

Find the Fourier transform of x(t).

5. Consider the signal x(t) = \sin(2\pi t) u(t).

Find the Fourier transform of x(t).

6. Consider the signal x(t) = e^{-at} u(t), where u(t) is the unit step function and a > 0.

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

7. Consider the signal x(t) = e^{-at} u(t), where u(t) is the unit step function and a > 0.

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

8. Consider the signal x(t) = \sin(2\pi t) u(t).

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

9. Consider the signal x(t) = e^{-at} u(t), where u(t) is the unit step function and a > 0.

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

10. Consider the signal x(t) = \sin(2\pi t) u(t).

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

11. Consider the signal x(t) = e^{-at} u(t), where u(t) is the unit step function and a > 0.

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

12. Consider the signal x(t) = \sin(2\pi t) u(t).

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

13. Consider the signal x(t) = e^{-at} u(t), where u(t) is the unit step function and a > 0.

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

14. Consider the signal x(t) = \sin(2\pi t) u(t).

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

15. Consider the signal x(t) = e^{-at} u(t), where u(t) is the unit step function and a > 0.

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

16. Consider the signal x(t) = \sin(2\pi t) u(t).

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

17. Consider the signal x(t) = e^{-at} u(t), where u(t) is the unit step function and a > 0.

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

18. Consider the signal x(t) = \sin(2\pi t) u(t).

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

19. Consider the signal x(t) = e^{-at} u(t), where u(t) is the unit step function and a > 0.

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

20. Consider the signal x(t) = \sin(2\pi t) u(t).

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

21. Consider the signal x(t) = e^{-at} u(t), where u(t) is the unit step function and a > 0.

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

22. Consider the signal x(t) = \sin(2\pi t) u(t).

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

23. Consider the signal x(t) = e^{-at} u(t), where u(t) is the unit step function and a > 0.

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

24. Consider the signal x(t) = \sin(2\pi t) u(t).

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

25. Consider the signal x(t) = e^{-at} u(t), where u(t) is the unit step function and a > 0.

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

26. Consider the signal x(t) = \sin(2\pi t) u(t).

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

27. Consider the signal x(t) = e^{-at} u(t), where u(t) is the unit step function and a > 0.

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

28. Consider the signal x(t) = \sin(2\pi t) u(t).

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

29. Consider the signal x(t) = e^{-at} u(t), where u(t) is the unit step function and a > 0.

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.

30. Consider the signal x(t) = \sin(2\pi t) u(t).

Find the impulse response of the system y(t) = x(t) * h(t), where h(t) is the impulse response of the system.