1. Explain why 𝑥(𝑡) = 𝐶𝑒 𝑗𝜔0𝑡 is always periodic with fundamental period 𝑇0 = 2𝜋/ wo . (Hint: Use Euler’s identity).

𝑥(𝑡 + T­­0) = 𝐶e 𝑗𝜔0(𝑡+T0) = Cejw0(t+2π/w­0) = C(ejw­0­t\*ejw­0­2π/w0) = C(ejw0t\*ej2π) = C(ejw0t\*1) = Cejw0t

Because the signal repeats after the interval of time T­­­0, the function is always periodic.

1. Explain why the rate of oscillation of discrete time exponential signal 𝑥[𝑛] = 𝑒 𝑗𝑤0𝑛 does not increase with 𝑤0. At what value is the rate of oscillation maximum and why?

x’[n] = ej(w0+2π)n=ejw0nej2πn=ejw0n(cos(2πn)+jsin(2πn)) = ejw0n = x[n]

Even though the frequency changed to w­0+2π, the signal x’[n]=x[n].

The value where the rate of oscillation is maximum is +π and –π because when you plug those into the equation a negative value returns. When it is negative, the sign of x[n] alternates between positive and negative.

1. Define x[n]u[n], where x[n] is a discrete time signal and u[n] is the discrete time unit step function.
2. Is the system 𝑦[𝑛] = 2𝑥[𝑛] + 3 linear? Provide proof.

y1[n] = 2(1) + 3 = 5

y2[n] = 2(2) + 3 = 7

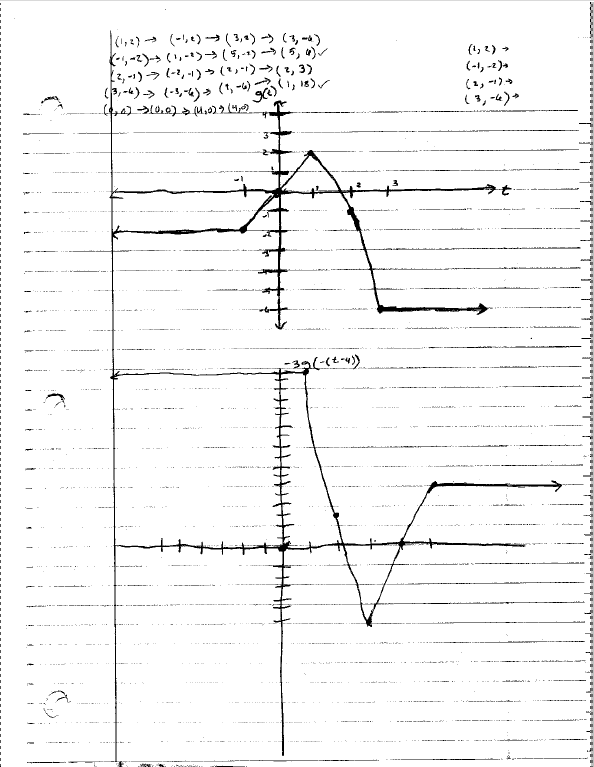
2(1+2) + 3 = 9

5+7=12

9 is not equal to 12

The system is NOT linear.

1. Chapter 2 Problem 35(a)… Graph the original and transformed function



1. Chapter 2 Problem 52(h)

1. Chapter 2 Problem 57(h)

Find the signal energy of the signal.

1. Chapter 3 Problem 27(a)

