

CARLETON UNIVERSITY

Department of Systems and Computer Engineering

SYSC 4600 – Digital Communications – Quiz 1 Solutions – Fall 2015

Professor H. Yanikomeroglu

16 September 2015

100 pts, 20 mins

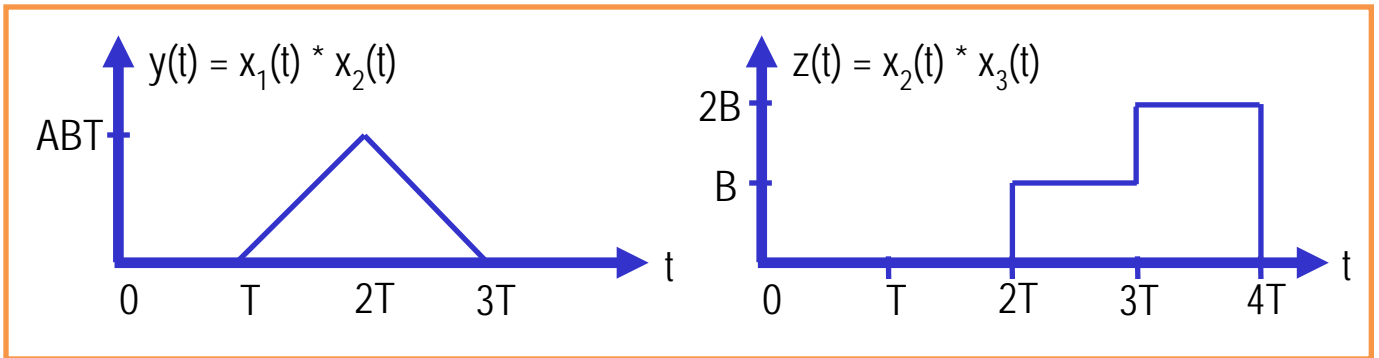
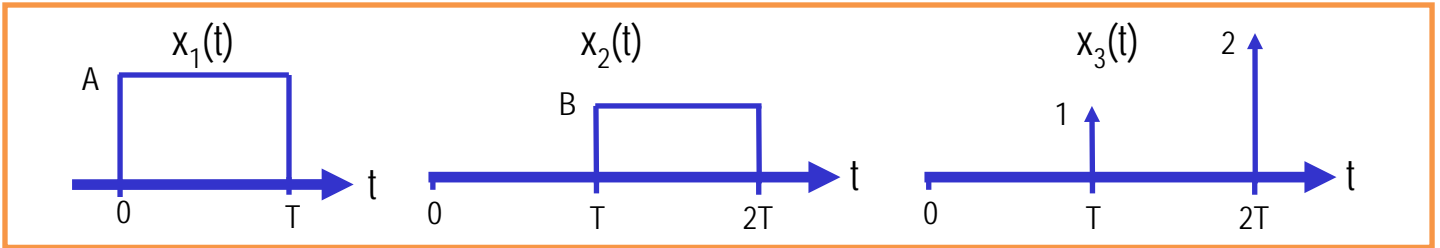
Name:

Student #:

E-mail:

Q1 [30+40=70 pts] – Convolution: $y(t) = x_1(t) * x_2(t)$. Sketch $y(t)$.

$z(t) = x_2(t) * x_3(t)$. Sketch $z(t)$.



Q2 [30 pts] – Power Calculations: Consider a wireless channel with a bandwidth of 1 MHz. SNR at the receiver is 6 dB, the AWGN power spectral density is $N_0 = -174$ dBm/Hz, and the receiver noise figure is 10 dB. Find the received signal power, P_s , in Watts.

$$P_N = N_0 + B + F = -174 \text{ dBm/Hz} + 60 \text{ dBHz} + 10 \text{ dB} = -104 \text{ dBm}$$

$$\text{SNR} = P_s - P_N$$

$$P_s = \text{SNR} + P_N = 6 \text{ dB} + -104 \text{ dBm} = -98 \text{ dBm} = -128 \text{ dBW} = 1.58 \times 10^{-13} \text{ W}$$