King Saud University
College of Engineering
Electrical Engineering Department

EE320 HW # 9

Q1) The spectrum of a signal *m(t)* is shown in Fig.Q1. This signal is ideally sampled using train of impulses.

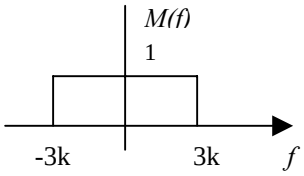

Fig.Q1

a) Sketch the spectrum of the sampled signal $g_\delta(t)$ when

i) f_s = 7 kHz.
ii) f_s equals the Nyquist rate
iii) f_s = 5 kHz

b) The sampled signal is passed through an ideal low-pass filter LPF which is band-limited to 3 kHz. Sketch the spectrum of the output signal for each of the three sampling rates given above.

Q2) Given a signal $g(t) = 10\cos(100\pi t)\cos(500\pi t)$
This signal is sampled at a rate of 600 samples per second.

a) Sketch the spectrum of the resulting sampled signal.
b) Find the sampling period T_s.
c) Find the Nyquist rate for this signal.
d) Find the maximum value of the sampling time.
e) Specify the cutoff frequency of the ideal reconstruction filter so as to recover *g(t)* from its sampled version.

Q3) The signal $m(t) = 2\cos(3\pi t) + 0.25\cos(8\pi t)$ is periodically sampled every T_s sec.

a) What is the maximum value of the sampling time T_s.

b) Given a sampling signal $s(t) = 6\sum_{n=-\infty}^{\infty}\delta(t-0.125n)$, and the sampled signal $m_s(t) = m(t)\,s(t)$ where $m_s(t) = \sum_{n=-\infty}^{\infty} I_n\delta(t-0.125n)$, determine the value of I_o, I_1, and I_3.