UNIVERSITY OF TEXAS AT DALLAS
Telecommunications Engineering

TE3302 Signals & Systems
Fourier Transform and Sampling

Answers to the practice problem set for the final exam.

F.1 $X(jw) = \frac{1}{jw+b}$

(a) $V(jw) = \frac{e^{j4w/5}}{jw+5b}$

(b) $V(jw) = \frac{2}{(jw+b)^3}$

(c) $V(jw) = \frac{1}{j(w-1)+b}$

(d) $V(jw) = \frac{1}{2j(w-4)+b} + \frac{1}{2j(w+4)+b}$

(e) $V(jw) = \frac{-w^2}{jw+b}$

(f) $V(jw) = \frac{1}{(jw+b)^2}$

(g) $V(jw) = -2\pi e^{-bw}u(w)$

F.2 (a) $x(t) = \frac{6}{\pi}\cos wt - \frac{4}{\pi}\sin 2wt$

(b) $x(t) = 0.5\delta(t-4) + 0.5\delta(t+4)$

(c) $x(t) = e^{-2t+3}u(t-1.5) - e^{-2t+5}u(t-2.5)$

(d) $x(t) = 1.5(e^{-2t}u(t) + e^{-4t}u(t))$

F.3 (a) $X(jw) = -4je^{-jw}\frac{\sin^2 w/2}{w}$

(b) $X(jw) = 2\frac{\sin 3w/2}{w}e^{-jw/2} + 2\frac{\sin w}{w}$

F.4 $y(t) = 2\cos w_0 t + 3\sin 2w_0 t$

F.5 (a) w_s (Nyquist frequency or rate)$=8,000\pi$

(b) w_s (Nyquist frequency or rate)$=2,000\pi$