Quiz #5 — soln. — sec. II.

$$H(s) = \frac{s+1}{(s-1)(s+5)(s-3)}$$

(a) $h(t)$ for $-5 < Re\{s\} < 1$
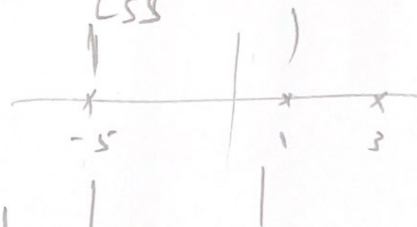
$$H(s) = \frac{A}{s-1} + \frac{B}{s+5} + \frac{C}{s-3}$$

$$A = \frac{s+1}{(s+5)(s-3)}\bigg|_{s=1} = \frac{2}{(6)(-2)} = -1/6$$

$$B = \frac{s+1}{(s-1)(s-3)}\bigg|_{s=-5} = \frac{-4}{(-6)(-8)} = -\frac{1}{12}$$

$$C = \frac{s+1}{(s-1)(s+5)}\bigg|_{s=3} = \frac{4}{(2)(8)} = \frac{1}{4}$$

$$H(s) = \underbrace{\frac{-1/6}{s-1}}_{LSS} - \underbrace{\frac{1/12}{s+5}}_{RSS} + \underbrace{\frac{1/4}{s-3}}_{LSS}$$

$$h(t) = \frac{1}{6} e^{t} u(-t) - \frac{1}{12} e^{-5t} u(t)$$

$$- \frac{1}{4} e^{3t} u(-t)$$

(b) System is stable since $j\omega$-axis is in the ROC

$$\int_{-\infty}^{\infty} |h(t)| \, dt < \infty$$

Quiz #5 - sec 1

$$x(n) = (-1)^n$$

a) N ?
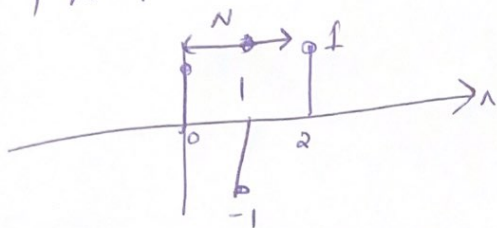
$N = 2$ Samples.

b) $P_x = \dfrac{1}{2} \displaystyle\sum_{n=0}^{1} |x(n)|^2 = \dfrac{1}{2}\left[(1)^2 + (-1)^2\right] = 1$

Quiz #3 — Soln. (10/10)

$$I = \int_{-\infty}^{\infty} 2 \sin c^2(15t)\, dt$$

4. Points

Let $g(t) = \sin c(15t) \longleftrightarrow G(\omega) = \frac{1}{15} \text{rect}\left(\frac{\omega}{30\pi}\right)$
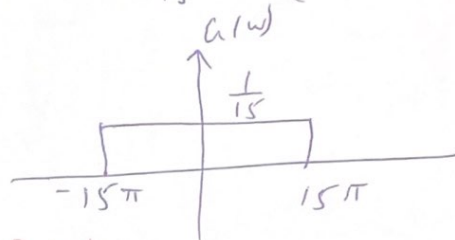
$$I = 2 \cdot \frac{1}{2\pi} \int_{-\infty}^{\infty} \left| G^*(\omega) \right|^2 d\omega \quad \text{3 Points}$$

$$= \frac{1}{\pi} \int_{-15\pi}^{15\pi} \left(\frac{1}{15}\right)^2 d\omega = \frac{30\pi}{\pi} \cdot \frac{1}{(15)^2} = \frac{30}{15 \cdot 15} = \frac{2}{15}$$

3 Points