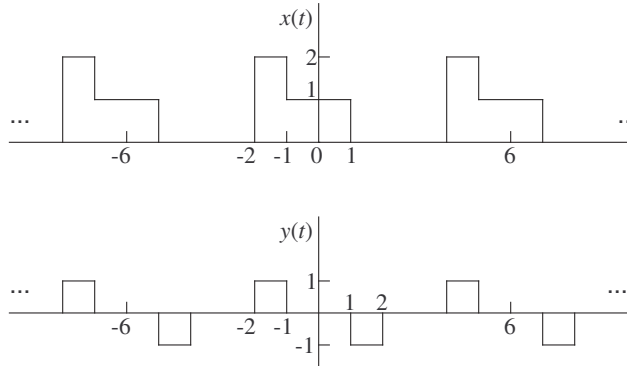


ENEE 222: 4/25 Class

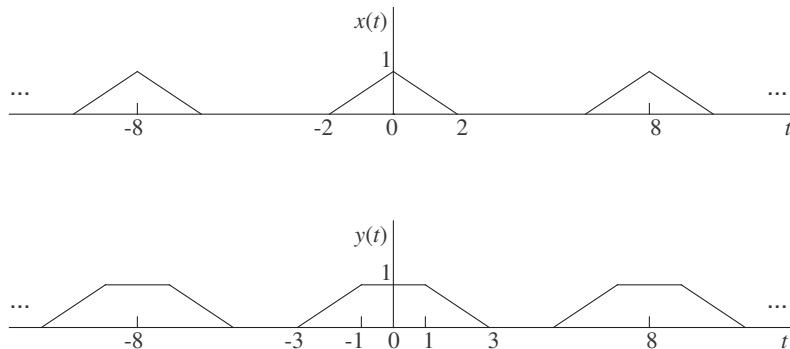
1. The signals $x(t)$ and $y(t)$ shown below are both periodic with fundamental period $T_0 = 6$.



If $\{X_k\}$ and $\{Y_k\}$ are the corresponding (complex) Fourier series coefficients, which (one or more) of the following statements is true for all indices k ?

- A. $Y_k = \frac{X_k + X_{-k}}{2}$
- B. $Y_k = \frac{X_k - X_{-k}}{2}$
- C. Y_k is real-valued
- D. Y_k is purely imaginary

2. The signals $x(t)$ and $y(t)$ shown below are both periodic with fundamental period $T_0 = 8$.



What is the relationship between the corresponding Fourier series coefficients $\{X_k\}$ and $\{Y_k\}$?

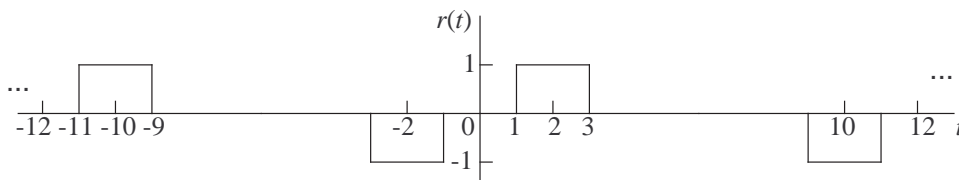
- A. $Y_k = X_k \cos(\pi k/4)$
- B. $Y_k = X_k \cos(\pi k/2)$
- C. $Y_k = 2X_k \cos(\pi k/4)$
- D. $Y_k = 2X_k \cos(\pi k/2)$

3. Let $s(t)$ be a real-valued periodic signal with fundamental period $T_0 = 0.02$ seconds. If $s(t)$ contains no harmonics higher than the tenth, then

$$x(t) = s(t) \cos(2000\pi t)$$

is the sum of at most

- A. eleven real sinusoids with frequencies in the band $[1,000, 1,500]$ Hz
 - B. twenty-one real sinusoids with frequencies in the band $[500, 1,500]$ Hz
 - C. eleven real sinusoids with frequencies in the band $[2,000, 2,500]$ Hz
 - D. twenty-one real sinusoids with frequencies in the band $[1,500, 2,500]$ Hz
4. (HW 24 i) Derive the Fourier series coefficients $\{R_k\}$ of the periodic signal $r(t)$ of period $T_0 = 12$ (seconds) shown below.



5. (HW 24 iv) Derive the Fourier series coefficients $\{X_k\}$ of the periodic signal $x(t)$ shown below (curved segments are sinusoidal half-cycles).

