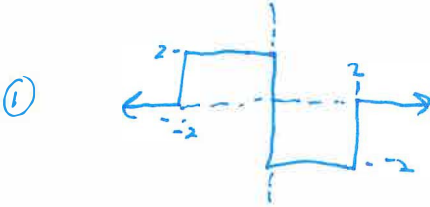


EE3032 - Dr. Durant - Quiz 3
Fall 2017, Week 3

- (1 point) Sketch the signal $x(t) = 2u(t+2) - 4u(t) + 2u(t-2)$.
- (3 points) Calculate the energy in the above signal.
- (3 points) Set up the integral for the power of $x(t) = \sin(2\pi t)$ and simplify the integrand (the function being integrated), but do not evaluate the integral.
- (1 point) Sketch the integrand.
- (2 points) Evaluate the power integral.

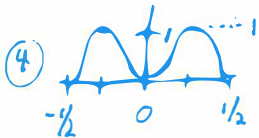


② $E_x = \int_{-\infty}^{\infty} x^2(t) dt = \int_{-2}^0 2^2 dt + \int_0^2 (-2)^2 dt = 8 + 8 = 16$

③ $\omega = 2\pi \frac{\text{rad}}{\text{s}}$ $F = \frac{\omega}{2\pi} = 1 \text{ Hz}$ $T = \frac{1}{F} = 1 \text{ s}$

power of periodic signal = power over (any) period

$$P_x = \frac{1}{T} \int_{-T/2}^{T/2} x^2(t) dt = \int_{-1/2}^{1/2} \sin^2(\downarrow 2\pi t) dt = \int_{-1/2}^{1/2} \frac{1}{2} \downarrow \cos(4\pi t) dt$$



⑤ $P_x = 2 \int_0^{1/2} \frac{1}{2} - \frac{1}{2} \cos(4\pi t) dt = 2 \left[\frac{1}{2} t - \frac{1}{8\pi} \sin(4\pi t) \right] \Big|_0^{1/2}$

$$= 2 \left[\left(\frac{1}{4} - \frac{1}{8\pi} \sin(2\pi) \right) - \left(0 - \frac{1}{8\pi} \sin(0) \right) \right]$$

$$= 2 \left[\left(\frac{1}{4} - 0 \right) - (0 - 0) \right]$$

$$= \frac{1}{2}$$

There are various shortcuts you might have used for evaluating this integral.