

Signals and Systems ECE 202
Assignment 3

1. Use the properties of integrals of even and odd functions to evaluate these integrals in the quickest way.

(a) $\int_{-1}^1 (2 + t) dt$

(b) $\int_{-1/20}^{1/20} [4 \cos(10\pi t) + 8 \sin(5\pi t)] dt$

(c) $\int_{-1/10}^{1/10} t \cos(10\pi t) dt$

(d) $\int_{-1/10}^{1/10} t \sin(10\pi t) dt$

(e) $\int_{-1}^1 e^{-|t|} dt$

(f) $\int_{-1}^1 t e^{-|t|} dt$

2. Find the signal energy of these signals

(a) $x(t) = 2\text{rect}(t)$

(b) $x(t) = A(u(t) - u(t - 10))$

(c) $x(t) = u(t) - u(10 - t)$

(d) $x(t) = \text{rect}(t) \cos(2\pi t)$

(e) $x(t) = 3\text{tri}(\frac{t}{4})$

3. Find and plot the following convolutions

(a) $\text{rect}(t) * \text{rect}(t)$

(b) $\text{rect}(t/4) * \text{rect}(t/4)$

(c) $\text{rect}(t - 2) * \text{rect}(t)$

(d) $\text{rect}(t/4) * \text{rect}(t/2)$

(e) $\text{rect}(t/a) * \text{rect}(t/b)$ where $a < b$.

4. Find and plot the following convolutions

(a) $g(t) = \text{rect}(t) * \text{tri}(t)$

(b) $g(t) = e^{-t}u(t) * e^{-t}u(t)$

(c) $g(t) = h(t) * x(t)$ where $x(t) = 4e^{-4t}u(t)$ and $h(t) = \text{rect}(2(t - \frac{1}{4}))$