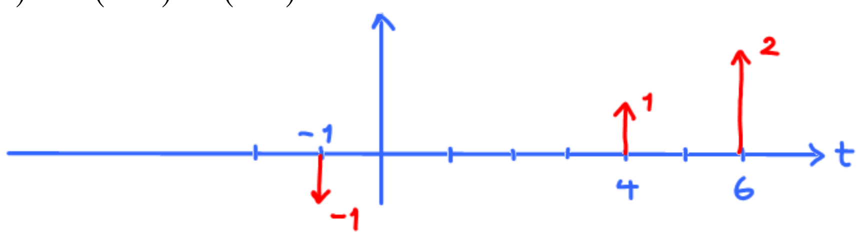
ECS 332: In-Class Exercise 1 **Solution**

Instructions

1. Separate into groups of no more than three persons.
2. Only one submission is needed for each group.
3. **Do not panic.**

Name	ID
Prapun	555

1) Plot $\delta(t-4)+2\delta(t-6)-\delta(t+1)$.



2) Evaluate the following integrals:

a) $\int_5^7 \delta(t)dt = 0$

The delta function is concentrated @ $t=0$.

The interval that we integrate over does not contain 0.

b) $\int_5^7 \delta(t-6)dt = 1$

This delta function is concentrated @ $t=6$.

The interval that we integrate over contains 6

c) $\int_{-\infty}^{\infty} \underbrace{(t^2+1)}_{g(t)}\delta(t)dt \underset{\text{sifting property}}{=} g(0) = 0^2+1 = 1$

d) $\int_{-\infty}^{\infty} (t^2+1)\delta(t-6)dt \underset{\text{sifting property v2}}{=} g(6) = 6^2+1 = 36+1 = 37$

$g(t)\delta(t) = g(0)\delta(t)$

e) $\int_5^7 \underbrace{(t^2+1)}_{g(t)}\delta(t)dt = \int_5^7 g(0)\delta(t)dt = g(0)\int_5^7 \delta(t)dt = g(0)\times 0 = 0$

Alternatively, $\int_5^7 (t^2+1)\delta(t)dt = \int_{-\infty}^{\infty} g(t)\delta(t)dt \underset{\text{sifting property}}{=} g(0) = 0\times 1 = 0$

$g(t) = (1_{[5,7]}(t))(t^2+1)$

Similar justification.

$g(t)\delta(t-c) = g(c)\delta(t-c)$

To see this, note that because $\delta(t-c) = 0$ for $t \neq c$, the values of $g(t)$ @ $t \neq c$ do not matter.

f) $\int_5^7 \underline{(t^2+1)}\delta(t-6)dt = \int_5^7 g(6)\delta(t-6)dt = g(6)\int_5^7 \delta(t-6)dt = (6^2+1)\times 1 = 37$

Alternatively, $\int_5^7 (t^2+1)\delta(t-6)dt = \int_{-\infty}^{\infty} g(t)\delta(t-6)dt \underset{\text{sifting property v2}}{=} g(6) = 1\times(6^2+1) = 37$

$g(t) = (1_{[5,7]}(t))(t^2+1)$