**MT240: Complex Variables and Transforms**

# Worksheet 14

*Fri, May 10*

*Spring 2019*

Roll# Student 1: Roll# Evaluator 1:

Roll# Student 2: Roll# Evaluator 2:

## Problem 1

For each of the following functions,

(a) $2$

(b) $2\delta(t)$

(c) $2\delta(t-5)$

(d) $2u(t+5)$

(e) $2\cos(3t)+4$

(f) $2\sin(3t)-4$

(g) $2\delta(t) * \sqcap_4(t)$

(h) $2\delta(t-5) * \sqcap_4(t)$

(i) Sketch its graph in the time domain.

(ii) Find its Fourier transform.

(iii) Sketch its magnitude and phase spectrum.

## Problem 2

Find and sketch the inverse Fourier transform of the following functions.
[You can use the Fourier transform table in the 'Notes'].

(a) $F(\omega) = \dfrac{1}{3+i\omega}$

(b) $F(\omega) = \dfrac{1}{9+\omega^2}$

(c) $F(\omega) = 2\pi\left(\delta(\omega+10)+\delta(\omega-10)\right)$

(d) $F(\omega) = \dfrac{4}{i\omega}$

## Problem 3

Sketch the following functions in (a) and (b). Then sketch their convolution product in (c).

(a) $\displaystyle\sum_{k=-\infty}^{\infty} \delta(t-2k)$

(b) $p_2(t)$

(c) $\displaystyle\sum_{k=-\infty}^{\infty} \delta(t-2k) * p_2(t)$