## EE 313 Signals and Systems (Fall 2024) Quiz #3

## Name <u>KEY A</u>

t(s)

Instructions: Closed book, notes & homework. Place answers in indicated spaces & show all work for credit.

Useful equation:  $x(t) * v(t) = v(t) * x(t) = \int_{-\infty}^{\infty} x(\lambda)v(t-\lambda) d\lambda = \int_{-\infty}^{\infty} v(\lambda)x(t-\lambda) d\lambda$ 

You wish to compute the convolution of the signals shown below, i.e., a(t) \* d(t), for all time.



a) Draw a **fully labeled** sketch of  $a(\lambda)$ .



b) Draw **fully labeled** sketches of reversed  $d(-\lambda)$  the time-shifted  $d(t-\lambda)$ .



c) From the sketches of  $a(\lambda)$  and  $d(t-\lambda)$ , note that it will be necessary to break the convolution integral over multiple time intervals (e.g.,  $t < t_1, t_1 \le t < t_2, \dots, t_M < t$ ). List the specific time intervals in the spaces below (more spaces than needed are provided).



d) How many time intervals are necessary to convolve a(t) \* d(t)? <u>4 total OR 2 non-zero</u>

## EE 313 Signals and Systems (Fall 2024) Quiz #3

## Name KEY B

Instructions: Closed book, notes & homework. Place answers in indicated spaces & show all work for credit.

Useful equation:  $x(t) * v(t) = v(t) * x(t) = \int_{-\infty}^{\infty} x(\lambda)v(t-\lambda) d\lambda = \int_{-\infty}^{\infty} v(\lambda)x(t-\lambda) d\lambda$ 

You wish to compute the convolution of the signals shown below, i.e., b(t) \* f(t), for all time.



a) Draw a **fully labeled** sketch of  $b(\lambda)$ .



b) Draw **fully labeled** sketches of reversed  $f(-\lambda)$  and time-shifted  $f(t-\lambda)$ .



c) From the sketches of  $b(\lambda)$  and  $f(t-\lambda)$ , note that it will be necessary to break the convolution integral over multiple time intervals (e.g.,  $t < t_1, t_1 \le t < t_2, \dots, t_M < t$ ). List the specific time intervals in the spaces below (more spaces than needed are provided).

 $t \le -2 s$  $-2 \le t \le 1 s$  $1 \le t \le 3 s$  $3 \le t \le 6 s$  $t \ge 6 s$ no overlapleading edge overlapsfull overlaptrailing edge overlapsno overlap

d) How many time intervals are necessary to convolve b(t) \* f(t)? <u>5 total OR 3 non-zero</u>