

ELEC 255 tutorial. Practice 7.

Laplace Transform

STUDENT #: _____ MARKS: _____/55

Problem 1: [5 marks/part]

Determine the Laplace transform and the associated region of convergence for each of the following functions of time:

(a) $x(t) = e^{-2t}u(t) + e^{-3t}u(t)$;

(b) $x(t) = e^{-4t}u(t) + e^{-5t}(\sin 5t)u(t)$;

(c) $x(t) = te^{-2|t|}$;

(d) $x(t) = |t|e^{2t}u(-t)$;

(e) $x(t) = \delta(3t) + u(3t)$.

Problem 2: [5 marks/part]

For each of the following integrals, specify the values of the real parameter σ which ensure that the integral converges:

(a) $\int_0^\infty e^{-5t}e^{-(\sigma+j\omega)t}dt$; (b) $\int_{-\infty}^0 e^{-5t}e^{-(\sigma+j\omega)t}dt$; (c) $\int_{-5}^5 e^{-5t}e^{-(\sigma+j\omega)t}dt$;

(d) $\int_{-\infty}^\infty e^{-5t}e^{-(\sigma+j\omega)t}dt$; (e) $\int_{-\infty}^\infty e^{-5|t|}e^{-(\sigma+j\omega)t}dt$; (f) $\int_{-\infty}^0 e^{-5|t|}e^{-(\sigma+j\omega)t}dt$.