

MATH 2120 – Homework 5 (due Thursday November 13, 2014 before class)

Note: For all problems, I suggest using the transform table on the front inside cover of your textbook, as that is what you will have for exams.

1. Section 4.1 (p. 275) #1, #3, #6, #10; please compute the answer using the integral definition of the Laplace transform.
2. Section 4.1 (p.276) #23, #25, #29, #31.
3. Section 4.2 (p. 287) #2, #4, #8, #11.
4. Section 4.3 (p. 296) #3, #4, #6.
5. Consider the Volterra integral equation

$$\phi(t) + \int_0^t (t - \xi) \phi(\xi) d\xi = \sin(2t). \quad (1)$$

(a) Show that if $u''(t) = \phi(t)$, then

$$u'' + u - tu'(0) - u(0) = \sin(2t). \quad (2)$$

- (b) Explain why we may take $u(0) = u'(0) = 0$ in (2) without loss of generality if we are only interested in $\phi(t)$. Then solve (2) with these initial conditions.
- (c) Solve (1) by using the Laplace transform. Verify your answer by comparing with part (b).