CARLETON UNIVERSITY
Department of Systems and Computer Engineering

SYSC 3600 – Systems & Simulation
Winter Semester, 2012

Assignment #1

Assigned: 13–January–2012
Due: in drop-box near 4499ME, Thursday, 26–January–2012

$\Longrightarrow$ **Please check the discussion board and announcements on WebCT often. All official course announcements are posted there.**

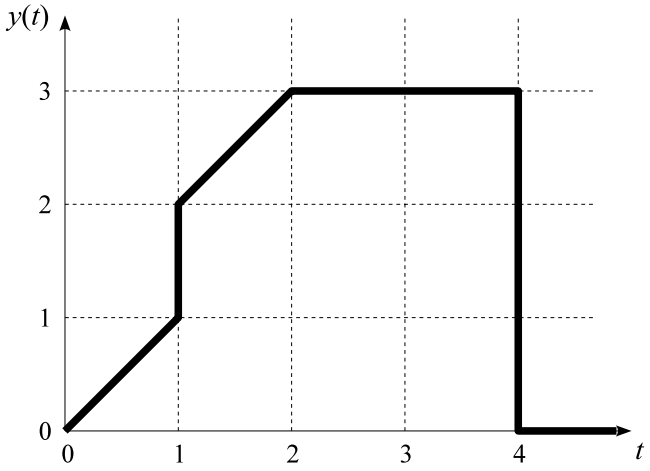
PROBLEM 1.1:

(a) *Question 1b in Chapter 2 of textbook.*

(b) *Question 1d in Chapter 2 of textbook.*

PROBLEM 1.2:
Determine the Laplace transform of the function $y(t)$ shown in the following figure. Begin by writing an equation for $y(t)$ using simple functions.

Hint: $y(t)$ can be expressed as a linear combination of two ramp functions and two step functions.



PROBLEM 1.3: *Question 7 in Chapter 2 of textbook.*

PROBLEM 1.4: *Question 8 in Chapter 2 of textbook.*

PROBLEM 1.5:
Consider the following Laplace transforms:

1. $F_1(s) = \dfrac{5(s+2)}{s(s+1)}$
2. $F_2(s) = \dfrac{s^2+2s+4}{s^2}$
3. $F_3(s) = \dfrac{3s+7}{4s^2+24s+136}$

Solve the following problems for these functions.

(a) Determine the inverse Laplace transform $f(t)$ for each function.

(b) Determine the initial value $f(0^+)$ for each function. Use the initial-value theorem.

(c) Determine the final value $f(\infty)$ (if it exists) for each function. Use the final-value theorem. If the final value does not exist, explain why.

(d) Show that the results obtained for the initial values and final values in (b) and (c) are the same as those obtained by directly evaluating $f(0^+)$ and $f(\infty)$ in the inverse Laplace transforms from (a).