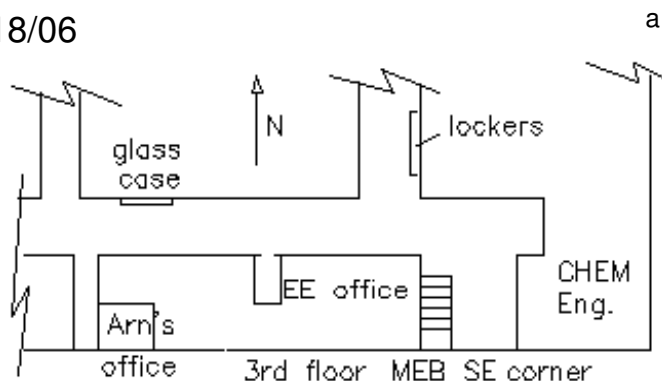ECE 3510   homework # 2   Due: Wed, 1/18/06   a

Homework should be turned in to the 3510 homework
locker (#9) by 5:00pm on the due date. Solutions will be
posted in a glass case west of the ECE office.

For problems 1 & 2:

  Don't just write down what the table shows.
  You must show some work of your own.
  You may use simpler table entries together with
  properties of the Laplace transform.

Good Transform tables: Nielson p.595 (7th ed.,p.547), Lathi p.372, Bodson p.5.
Good Property tables: Nielson p.601 (7th ed.,p.553), Lathi p.389, Bodson p.8.

1. Find the Laplace transform of the following functions:

   a) $u(t)$

   b) $\sin(\omega \cdot t) \cdot u(t)$

   c) $t \cdot u(t)$

2. Find the Laplace transform of the following functions:

   a) $e^{-a \cdot t} \cdot \sin(\omega \cdot t) \cdot u(t)$

   b) $e^{-a \cdot t} \cdot \cos(\omega \cdot t) \cdot u(t)$

3. Find the inverse Laplace transform of each of the following functions:

   Use partial fraction expansion and the tables.

   a) $F(s) = \dfrac{1}{s^2 + 5 \cdot s + 6}$

   b) $F(s) = \dfrac{s - 1}{s \cdot (s + 2)}$

   c) $F(s) = \dfrac{3 \cdot s}{\left(s^2 + 1\right) \cdot \left(s^2 + 4\right)}$

   d) $F(s) = \dfrac{1}{(s + 2) \cdot (s + 1)^2}$ We'll cover this type of partial fraction expansion on Wed.

Answers

1. a) $\dfrac{1}{s}$ b) $\dfrac{\omega}{s^2 + \omega^2}$ c) $\dfrac{1}{s^2}$

2. a) $\dfrac{\omega}{(s + a)^2 + \omega^2}$ b) $\dfrac{(s + a)}{(s + a)^2 + \omega^2}$

3. a) $\left(e^{-2 \cdot t} - e^{-3 \cdot t}\right) \cdot u(t)$ b) $\left(\dfrac{3}{2} \cdot e^{-2 \cdot t} - \dfrac{1}{2}\right) \cdot u(t)$ c) $(\cos(t) - \cos(2t)) \cdot u(t)$

   d) $\left(e^{-2 \cdot t} + t \cdot e^{-t} - e^{-t}\right) \cdot u(t)$

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