

## ECE 3510 homework # 2

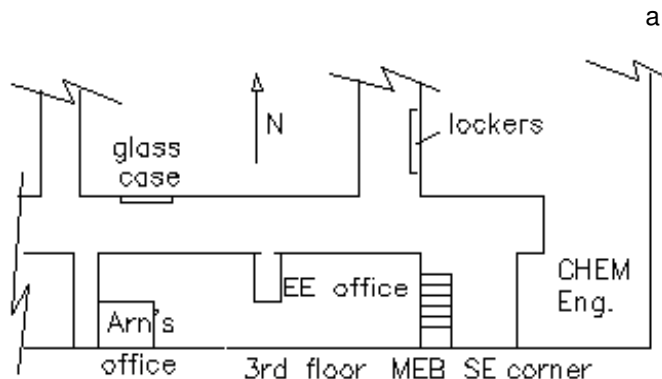
Homework should be turned in to the 3510 homework locker by 5:00pm on the due date. Solutions will be posted in a glass case west of the ECE office.

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.



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.

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

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

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

Use partial fraction expansion and the tables.

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

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

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

d)  $F(s) = \frac{1}{(s + 2) \cdot (s + 1)^2}$

### Answers

1. a)  $\frac{1}{s}$

b)  $\frac{\omega}{s^2 + \omega^2}$

c)  $\frac{1}{s^2}$

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

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

3. a)  $(e^{-2t} - e^{-3t}) \cdot u(t)$

b)  $\left(\frac{3}{2} \cdot e^{-2t} - \frac{1}{2}\right) \cdot u(t)$

c)  $(\cos(t) - \cos(2t)) \cdot u(t)$

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

$s := 1$