ELEC 243
Problem Set 5
Exam Section
Due: February 20, 2015

Exam Cover Sheet

Exam problems begin on the next page.

There is one problem this week. It has a two hour limit.

Before beginning you should read the following guidelines:

- All exam problems are pledged work.

- You may not discuss any problem with anyone other than the instructor.

- Unless otherwise specified, you **MAY** utilize:

    - A calculator.
    - Your textbook, class notes, and any material on or *directly* linked to the class web page.
    - A table of integrals.

- Unless otherwise specified, you **MAY NOT** utilize:

    - Matlab or any other computer software.
    - Any reference material other than those listed above.

- "Find" means to determine a numerical value or an algebraic expression for the indicated quantity or function. "Sketch" or "plot" means to draw a graph of the indicated function, not necessarily to accurate scale, but with labeled axes and important values indicated.

- Some problems will have a time limit. This will be indicated at the beginning of the problem itself and on the cover sheet. If no time limit is specified, you may use as much time as desired, subject to the solution being handed in on time.

When you are ready to begin, turn the page.

E5.1 This problem has a two hour time limit.

Let $x(t) = 2\cos(2t)$.

(a) Represent $x(t)$ as the real part of a single complex exponential.

(b) Represent $x(t)$ as the sum of two complex exponentials.

(c) $x(t)$ is applied to the input of a system having a transfer function $H(\omega) = \dfrac{1}{j\omega + 2}$. Find the output signal $y(t)$ and express it in the form $y(t) = A\cos(2t + \phi)$. What are the values of A and ϕ?