SCHOOL OF INFORMATICS,
COMPUTING, AND ENGINEERING

INDIANA UNIVERSITY

InClass Exercise 5
Due by 2/18/2018, Sunday Midnight through Canvas

Requirements: *Please ensure that all source code is tested properly and follows general code readability guidelines (i.e., includes proper variable names, adequate comments as well as brief description of your logic or pseudocode or algorithm used). Submit all files including any images.*

Solve the following questions from Gonzalez 4/E:

1. What is the convolution of two, 1D impulses
   a. $\delta(t)\, and\; \delta(t - t_0)$
   b. $\delta(t - t_0)\; and\; \delta(t + t_0)$

2. Use the sifting property of the Impulse to show that convolving a 1-D continuous function, $f(t)$, with an impulse located at t_0 shifts the function so that its origin is moved to the location of the impulse (if the impulse is at the origin, the function is not shifted)

3. Show that $F\{e^{j2\pi t_0 t}\} = \delta(\mu - t_0)$, *where* t_0 is a constant.

4. Show that the following expressions are true:
   a. $F\{\cos(2\pi\mu_0 t)\} = \frac{1}{2}[\delta(\mu - \mu_0) + \delta(\mu + \mu_0)]$
   b. $F\{\sin(2\pi\mu_0 t)\} = \frac{1}{2j}[\delta(\mu - \mu_0) - \delta(\mu + \mu_0)]$