ECEN 5696 – FOURIER OPTICS
Fall Semester 2012, University of Colorado at Boulder
QUIZ #1

Please answer the following questions and give a brief explanation of your answer in the space provided. This test will not affect your final grade in any way.

1. The value of the following integral: \[ \int_{-\infty}^{\infty} \cos(\omega_1 t) \cos(\omega_2 t) dt \quad (\omega_1 \neq \omega_2) \]
   a. \( \infty \)
   b. 0
   c. 1
   d. None of the above

2. A Gaussian function cannot be represented as a superposition of harmonic functions. T F

3. The support of the convolution of two functions is equal to the largest support among the convolved functions. T F

4. The Fourier transform is the only possible decomposition of a function in elementary functions. T F

5. The \( \delta \) - function does not have a Fourier transform because it is not a "real" function. T F

6. The impulse response of a linear time invariant (also called shift invariant) system satisfies \( h(t; \tau) = h(\tau - t) \). T F

7. The Fourier transform operation \( FT\{g(t)\} = \int_{-\infty}^{\infty} g(t) \exp(-j2\pi ft) dt \) is a time invariant operation. T F

8. When a signal is sampled at a sample rate that is smaller than the highest frequency that occurs in the pattern, the signal energy in the frequencies that are greater than the sample frequency is
   a. not detected and therefore is lost
   b. detected, but mistakenly identified as a lower frequency
   c. detected and can be retrieved with signal processing after detection

9. My undergraduate education was in……….. Graduated in the year…..

10. I have previously taken a course in Signals and Systems that included Fourier transforms YES NO