Math 222, Spring 2016.

Present your work in an organized fashion. Make sure that your work is algebraically correct and logically sound. Show all your work. Discussion (if necessary) with others is encouraged, while copying other's solution is a violation of NJIT student honor code. Do not forget that you should also be able to do (but not hand in) the homework problems listed on the syllabus.

Homework Problems for Chapter 10

1. Find the eigenvalues λ and eigenfunctions of the boundary value problem (for a positive constant $L > 1$)
$$x^2 y'' - xy' + \lambda y = 0, \quad y(1) = 0, \quad y(L) = 0.$$

2. In each of the following cases sketch the graphs of the even and odd extension of $f(x)$ of period $2L$, and then find the Fourier series for both even and odd extensions.

   (a)
   $$f(x) = \begin{cases} 1, & 0 < x < 1, \\ 0, & 1 < x < 2; \end{cases}$$

   (b)
   $$f(x) = \begin{cases} x, & 0 \le x < 2, \\ 1, & 2 \le x < 3; \end{cases}$$

   (c)
   $$f(x) = \begin{cases} 1 - x^2, & 0 \le x < 1, \\ 0, & 1 \le x < 2. \end{cases}$$