

**GEOP 320**  
**Spring 2009**  
**Convolution, Crosscorrelation, and Autocorrelation Programming Project**  
(Due date: 1/6/2009)

**Objective**

- The objective of this project is to write a program that performs the following operations:
  - Convolution
  - Crosscorrelation
  - Autocorrelation
- The grade of this project will be equivalent to 20% of the total course grade.
- The project grade will be used to substitute 80% of the midterm exam in the final course grade.

**Project Description**

- (1) The group is charged with the following tasks.
  - (a) Writing a program that reads two sampled functions  $x(t)$  and  $h(t)$  and optionally performs one or more of the following operations (25%):
    - A. Convolve  $x(t)$  and  $h(t)$ .
    - B. Crosscorrelate  $x(t)$  and  $h(t)$ .
    - C. Autocorrelate  $x(t)$  or  $h(t)$ .
  - (b) Testing your program on the inputs provided below (25%). This testing should be demonstrated during a lab session.
  - (c) Write a brief (3-5 pages) report providing the following parts (25%):
    - A printout of the program.
    - Results of the testing.
    - Comments on the strengths and weaknesses of the program.
  - (d) Professionally present your project (25%).
- (2) Use the following inputs to test your program:
  - $x(t) = (2,1)$ .
  - $h(t) = (1,0,-1)$ .

**Notes**

- Your program should be flexible to accept inputs of any length.
- The user should only provide the following inputs:
  1. The input functions  $x(t)$  and  $h(t)$ .
  2. The desired operation (i.e., convolution, crosscorrelation, autocorrelation of  $x(t)$  or  $h(t)$ ).
- The program should be able to output the result of the desired operation.