CS4731- A Term '98 - Midterm Exam

Name:

Read questions carefully before answering. Do not hesitate to ask for clarification. Show all work. Partial credits are given, so do not leave anything blank! Use the back of the pages or extra paper as needed. Good luck!

1. (15 pts) Write a C function to generate an array of 2-D vertices which form a *Star* shape, centered at (C_x, C_y) with P points, an inner radius (the vertices closest to the center) of R_{in}, and an outer radius (the vertices furthest from the center) of R_{out}.

2. (15 pts) Give an example of a pair of transformations which are **NOT** commutative. Prove your assertion using matrix multiplication.

3a. (10 pts) Name 4 of the logical input device classes and describe how you might implement each using only a joystick.

3b. (10 pts) What is the result of projecting the edge from $(2.0, 3.0, 4.0)$ to $(3.0, 4.0, 5.0)$ onto the x-z plane?

CS4731 - A '98 - Midterm Exam

4. (15 pts) What is the *Normal Vector* for each of the following:

a. the line going through the points $(.5, 1.5)$ and $(.75, 3.0)$.

b. the plane given by the equation $17x + 13y + 11z = 7$.

c. The plane containing the points $(1.0, 2.0, 3.0)$, $(2.0, 3.0, 4.0)$, and $(5.0, 5.0, 5.0)$.

5. (20 pts) Given a rectangular window bounded by the points $(-1, 1)$ and $(7, 10)$, what are the results of clipping the following edges:

a. $(2, 0)$ to $(5, 15)$

b. $(9, 10)$ to $(6, -5)$

c. $(3, -2)$ to $(6, 13)$

d. $(8, 14)$ to $(5, -1)$

6. (15 pts) Describe an algorithm to select a point that lies within a given polygon (need this for recursive flood filling).