



UNIVERSITY OF REGINA
FACULTY OF ENGINEERING
ENIN 444 – Computer-Aided Engineering
MIDTERM EXAM (CLOSED BOOK, 75 MINUTES)

November 1, 2001

Total Marks (100)

PLEASE RETURN THE EXAMINATION ALONG WITH THE BOOKLET

I. Theoretical Questions

Question # 1 (15 points)

In solid modeling, data structure is classified into 3 types: CSG tree, Boundary representation, and decomposition model.

- ✓(a) What are the advantages and limitations of the CSG tree representation approach?

Question # 2 (a=10, b=5, total=15 points)

The product development cycle is composed of two main processes, the design process and the manufacturing process.

- ✓(a) Briefly define the design process and present a sketch showing all the activities related to this process.
- ✓(b) Based on your answer in (a), identify and list the activities that relate to synthesis; and those that relate to analysis.

Question # 3 (a=5, b=5, c=5, d=5, total=20 points)

✓ Let consider A Bézier curve of order n.

- ✓(a) How many control points this curve has?
- ✓(b) Describe the main characteristics of this curve.
- ✓(c) How useful and why it is important to calculate the curve's first- or higher order derivatives?
- ✓(d) What is the difference between a Bézier curve and a Hermite curve?

Question # 4 (a=5, b=5, c=5, total=15 points)

- ✓(a) List the components of a graphics device and explain the role of each component.
- ✓(b) Explain how animation can be realized in a vector-refresh graphics device
- ✓(c) Explain the reason why flickering does not occur in raster graphics device.

Question # 5 (a=15, total=15 points)

- ✓(a) Define rendering and briefly describe two major rendering technologies

II. Numerical Questions

Problem # 1 (a=10, b=10, total=20 points)

A point p lies originally at the position $[\sqrt{2}, 0]$.

- ✓(a) Find the new coordinates of this point if it is rotated 45° CCW about the origin.
- ✓(b) If the point is given a subsequent rotation of 45° CCW, what will its coordinates be?