

Name _____ Student ID _____

PRINCE OF SONGKLA UNIVERSITY
DEPARTMENT OF INDUSTRIAL ENGINEERING

Midterm Exam: First Semester

Academic Year: 2008

Date: 1 สิงหาคม 2551

Time: 13:30 – 16:30

Course: 226-332 Basic CAD/CAM

Room: A200

ทุจริตในการสอบ โทษขั้นต่ำคือ ปรับตกในรายวิชาที่ทุจริตและพักการเรียน 1 ภาคการศึกษา

Instructions:

1. The exam has 4 problems and 80 points.
2. Use of dictionaries and calculators is allowed.
3. This is a closed book exam.

Problem	Score	Your Score
1	20	
2	20	
3	20	
4	20	
Total	80	

Supapan Chaiprapat

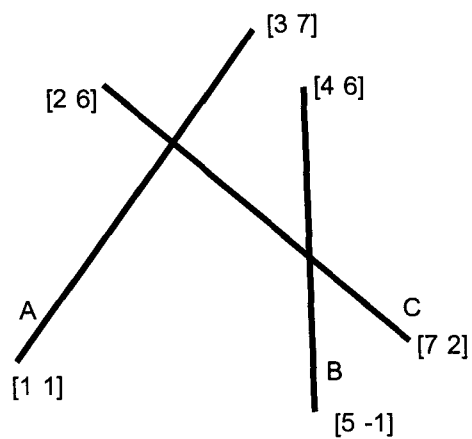
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1. (20) Line A, B, and C have end points as shown below, find

1.1 (5) A analytic equation of line A

1.2 (5) A parametric equation of line B

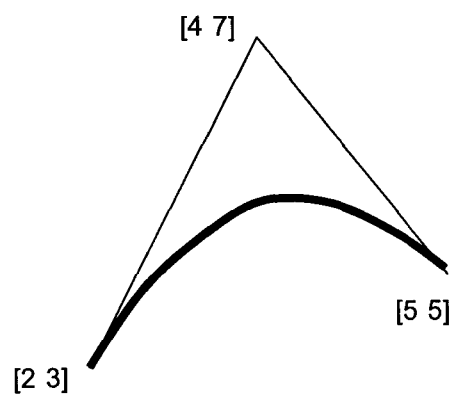
1.3 (10) When $t_c = 0$ at $[7 \ 2]$ and $t_c = 2$ at $[2 \ 6]$, what's the value of t_c (parameter of Line C) at which Line B and Line C intersects?



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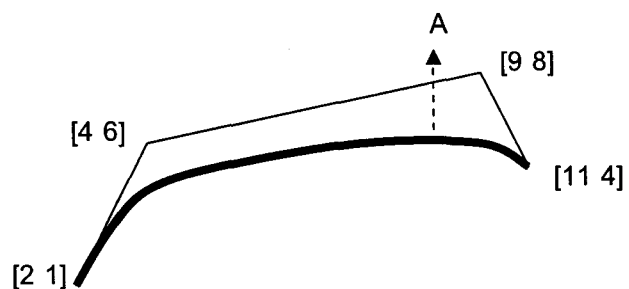
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2. (20) What is the equation of an Hermite curve for the following Bezier?

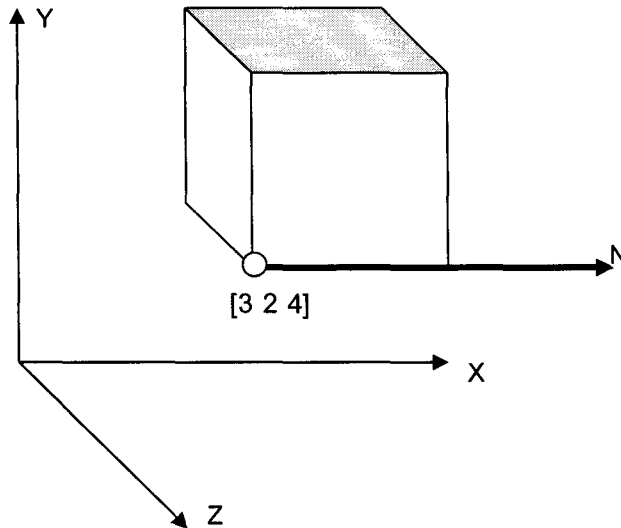


OR

3. (20) A robot to be painting color on a car's front hood which its shape is formed from a Bezier curve as shown. The robot hand must be always kept perpendicular to the curve to obtain a uniform distribution of paint. What is the orientation of the hand (the direction of an arrow 'A') at $u = .75$?



4. (20) A block of 5x5x5 in. is rotated around the axis 'N' by 35 degree before being translated by [5 -2]. What is the equation of the highlighted plane after transformations?



สูตร 226-332

สมการ Hermite curve เป็นดังนี้

$$P(u) = (2u^3 - 3u^2 + 1)P_0 + (-2u^3 + 3u^2)P_1 + (u^3 - 2u^2 + u)P'_0 + (u^3 - u^2)P'_1$$

สมการ Bezier curve เป็นดังนี้

$$P(u) = \sum_{i=0}^n P_i B_{i,n}(u)$$

$$B_{i,n}(u) = F(n, i) u^i (1-u)^{n-i}$$

$$F(n, i) = \frac{n!}{i!(n-i)!}$$

Transformation Matrices

$$R_z = \begin{bmatrix} \cos \theta & -\sin \theta & 0 \\ \sin \theta & \cos \theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$R_y = \begin{bmatrix} \cos \theta & 0 & \sin \theta \\ 0 & 1 & 0 \\ -\sin \theta & 0 & \cos \theta \end{bmatrix}$$

$$R_x = \begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos \theta & -\sin \theta \\ 0 & \sin \theta & \cos \theta \end{bmatrix}$$