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PRINCE OF SONGKLA UNIVERSITY

Department of Industrial Engineering

Final Exam:	Second Semester	Academic Year: 2005
Date:	15 December 2005	Time: 9:00 - 12:00
Course:	226-332 Basic CAD/CAM	Room: A400

ทุจริตในการสอบ โทษขั้นต่ำคือ ปรับตกในรายวิชาที่ทุจริตและพักการเรียน 1 ภาคการศึกษา

Instructions:

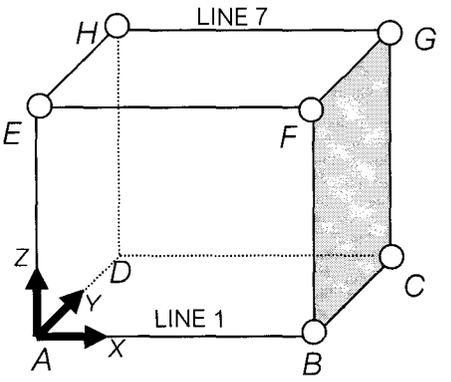
1. The exam has a total of 3 problems and 90 points.
2. Use of dictionaries and calculators is **NOT** allowed.
3. This is a closed book exam.

Problem	Score	Your Score
1	45	
2	15	
3	30	
Total	**90**	

Supapan Chaiprapat

Name.....ID.....

Question 1. (45 points) A block is constructed from the points in the table. Find



Point	Coordinate	Point	Coordinate
A	[0 0 0]	*E*	[0 0 6]
B	[5 0 0]	*F*	[5 0 6]
C	[5 3 0]	*G*	[5 3 6]
D	[0 3 0]	*H*	[0 3 6]

2.1 an equation of a line connecting G and D (10 points)

Name.....ID.....

2.2 distance from LINE1 to LINE7 (10 points)

2.2 an equation of a plane passing through E, H, and G (10 points)

2.3 an equation of a plane passing through C, H, and B (15 points)

Name.....ID.....

Question 2. (15 points) Given an equation of a cubic Bezier curve with control points located at [0 1], [2 5], [5 4], and [8 1], calculate a tangent vector at u = 0.30.

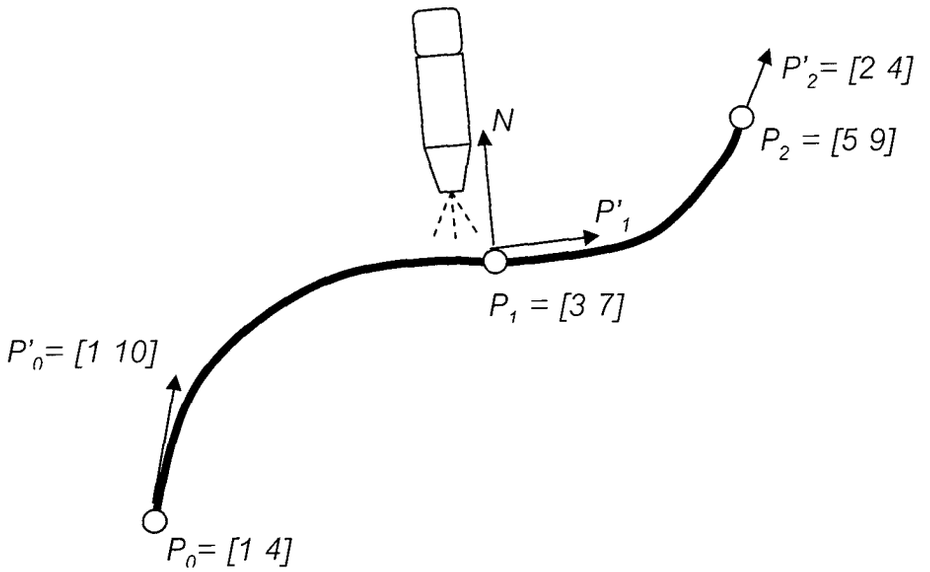
$$P(u) = (-P_0+3P_1-3P_2+P_3)u^3 + (3P_0-6P_1+3P_2)u^2+(-3P_0+3P_1)u+P_0$$

Name.....ID.....

Question 3. (30 points) A robot is programmed to weld along the curved welding path as shown below. During the operation, the robot must stay perpendicular to the curve at all time. If the curve is explained by using a Hermite equation, find

(a) a position of the robot at halfway between P_0 and P_1 (10 points)

(b) a vector (N) representing the robot's gripper orientation when it comes to P_1 (20 points)



$C_0 = P_0$

$C_1 = P'_0$

$C_2 = 3(P_1-P_0) -2P'_0-P'_1$

$C_3 = 2(P_0-P_1) +P'_0+P'_1$