PRINCE OF SONGKLA UNIVERSITY

DEPARTMENT OF INDUSTRIAL ENGINEERING

Midterm Exam: First Semester — Academic Year: 2010

Date: 4 สิงหาคม 2553 — Time: 09:00 - 12:00

Course: 225-558 Computer Aided Design — Room: A201

ทุจริตในการสอบ โทษขั้นต่ำคือ ปรับตกในรายวิชาที่ทุจริตและพักการเรียน 1 ภาคการศึกษา

Instructions:

1. The exam has 6 problems and the total score is 80.
2. This is an open book exam.

Problem	Score	Your Score
1	10	
2	10	
3	10	
4	15	
5	15	
6	20	
Total	80	

1. (10) Explain the concept of "interpart expression" in Computer Aided Design and how it helps accelerate the design process.

2. (10) Answer only **one** question of the followings.

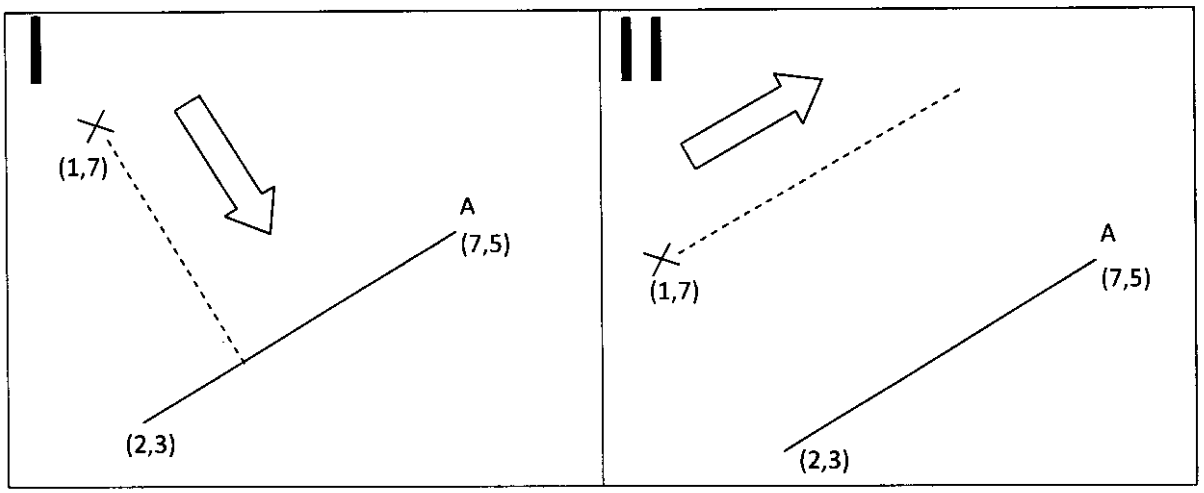
2.1 In the case study of Fontaine Trailer Company, list the constraints the company is under when designing a flatbed trailer. How does the CAD system help ease such constraints?

2.2 In the case study of JCB, what are the predictive techniques JCB used to design its engine?

2.3 In the case study of MAN B&W, list the benefits of the CAD system in designing such a complex and gigantic engine.

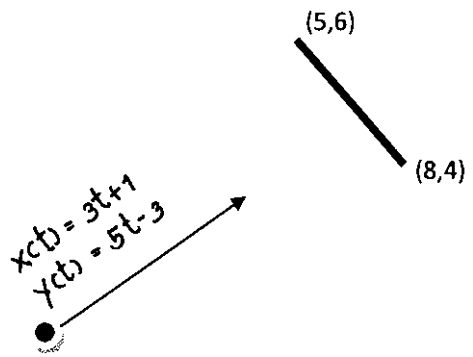
2.4 In the case study of Nissan Rally Raid Team, what makes designing a vehicle for the Telefonica-Dakar rally more challenging than designing a typical car? How does the CAD system help cope with those challenges?

3. (10) Using a derived line mode, a CAD system will automatically draw a line that is interrelated to the existing line. For example, if we click near line A (as shown) and move a pointer towards the line, the system will create a line perfectly perpendicular to A (window I). Again if we click near line A, but then move a pointer in the same direction as A, a line parallel to A will be displayed (window II).

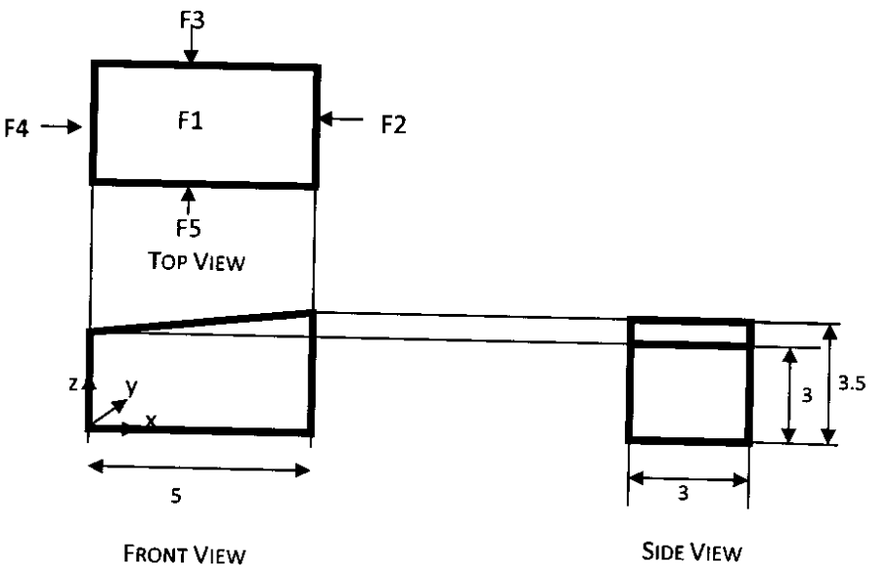


If we click at (1,7) to be drawing a derived line, what are the parametric equations of the dotted lines in Window I and II .

4. (15) A particle is shot to the target in the sky following the trajectory x(t) = 3t+1 and y(t)=5t-3. Will the particle hit the target? Prove.



5. (15) A workpiece as shown below is to be milled by a 5-axis machining center. Its bottom surface is set-up on a machine table. A cutting tool will be programmed to machine all other surfaces. While machining each surface (F1-F5), what is the direction of a cutting tool? A rule of thumb is that a cutting tool must be kept perpendicular to the surface at all time during the process.



6. (20) An Hermite curve equation for representing a profile of a bottle is shown in a dotted line.

6.1 (5) Which parameter do you want to adjust to have the dotted line move a bit closer to the actual profile? Why?

6.2 (15) If at u=0.5, the curve must pass through (6.5,5), what would the parameter in 6.1 be?