PRINCE OF SONGKLA UNIVERSITY

FACULTY OF ENGINEERING

Final Examination : Semester I   **Academic Year** : 2006

Date : October 7, 2006   **Time** : 13:30 – 16:30

Subject : 225 - 343 Production Management and Optimization   **Room** :   R 300

ทุจริตในการสอบ โทษขั้นต่ำปรับตกในรายวิชานั้น และพักการเรียน 1 ภาคการศึกษา

Directions
1. The following materials can be led into examination room :
   - Lecture notes, handouts, or textbooks.
   - Electronic handheld calculator and Electronic dictionary.
2. You have to answers ALL questions.
3. You have to fill your name and ID on this page, and fill only your name on the top-right corner of the other pages.
4. There are eleven pages, five problems = 40 points.

First name Mr./Miss   .... Last name ....

Student ID ....

Score (will be filled by lecturer)

Problem no.	Points	Your score
1	10	
2	12	
3	5	
4	8	
5	5	
	40	

***** This material was prepared by Asst. Prof. Charoen Jaitwijitra *****

1. (10 points) Solve the following problem using graphical method.

$$\text{Minimize} \quad Z \quad = \quad 8x_1 + 12x_2$$

$$\text{Subject to} \quad 5x_1 + 2x_2 \quad \geq \quad 20$$
$$4x_1 + 3x_2 \quad \geq \quad 24$$
$$x_2 \quad \geq \quad 2$$
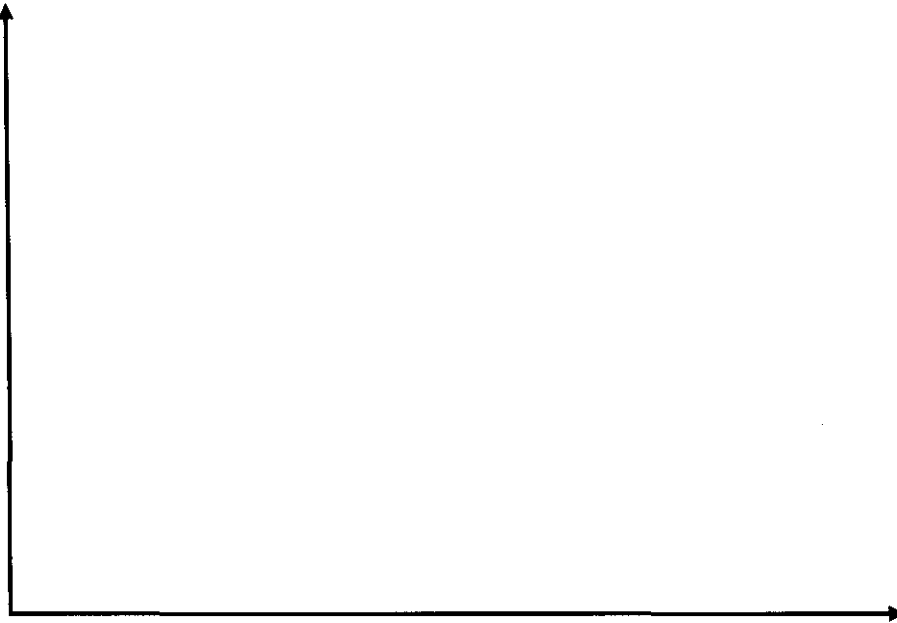
Fill your answers in the blanks.

$x_1 \quad = \quad$ ....

$x_1 \quad = \quad$ ....

Min. $Z =$ ....

2. (12 points) Solve the following problem using simplex method.

Maximize Z $=$ $4x_1 + 5x_2$

Subject to $\quad x_1 + 3x_2 \quad \leq \quad 12$

$\qquad\qquad 4x_1 + 3x_2 \quad \leq \quad 24$

$\qquad\qquad x_1, x_2 \quad \geq 0$

Don't forget to answer $x_1 = ?$, $x_2 = ?$, and maximize $Z = ?$

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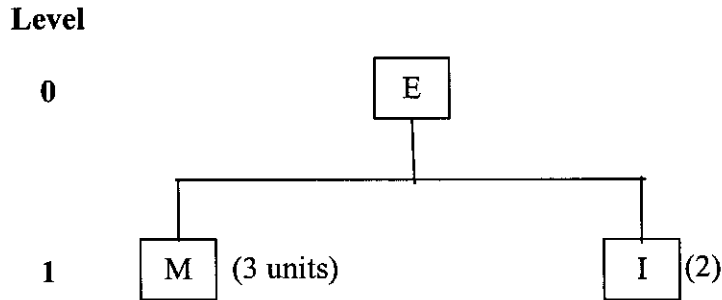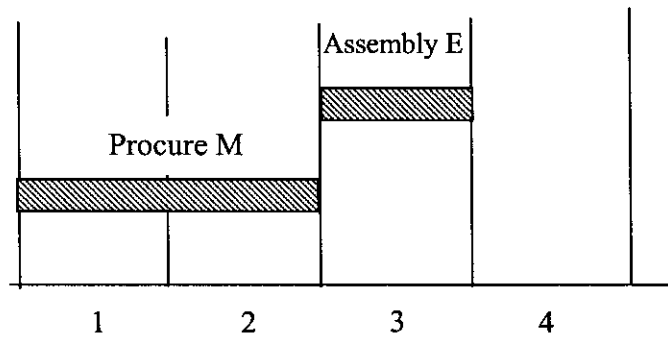
3. (5 points) The product structure tree for end item E is shown below. The manager wants to know the material requirements for ordered part M that will be needed to complete 120 units of E by the start of week 4. Lead times for items are one week for level 0 items and two weeks for level 1. There is a scheduled receipt of 60 units of M at the beginning of week 3. Lot-for-lot ordering is used.

Level

0

```
            ┌───┐
            │ E │
            └─┬─┘
      ┌───────┴───────┐
   ┌───┐           ┌───┐
   │ M │ (3 units) │ I │ (2)
   └───┘           └───┘
```

1

A Gantt chart that includes M and leads to completion of E by the start of week 3 looks like this:

```
                          │Assembly E│
                          ░░░░░░░░░░░░
           Procure M
        ░░░░░░░░░░░░░░░░░░
    ────┼────────┼────────┼────────┼────────
        1        2        3        4
```

Week number

(You can see that the procurement (จัดซื้อจัดหา) of items M will be finished at the end of week 2 or at the start of week 3, then the assembly of end items E will be started at the beginning of week 3 and to be completed by the start of week 4)

Write your answer into the following table that shown **the requirement plan of M.**

	Week number			
	1	2	3	4
Gross requirements			....	
On hand (คงเหลือในคลัง)	20	....	....	
Receipts			60	
Net requirements			....	
Production plan released	....			

4. (8 points) A group of six jobs are to be processed through a two-step operation. The first operation involves degreasing, and the second involves painting.

Job	Processing times (hours)	
	Work center 1	Work center 2
A	5	4
B	4	3
C	8	9
D	2	7
E	6	8
F	12	15

4.1. Determine a sequence that will minimize the total completion time for this group of jobs.

Job	....	....	....	....	....	....

4.2. Draws a chart to displays the throughput time and idle times at the two work centers.

Work Center 1	
Work Center 2	

0   25   50

5. (5 points) Solve the following problem using backward scheduling method.

Job	Job routes and processing time (hours)	Due hours
1	B(2), C(5)	9
2	A(6), B(1), C(3)	15
3	B(1), A(4)	10
4	A(2), B(5)	12

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  1   2   3   4   5   6   7   8   9   10  11  12  13  14  15
                           hour
```