DEPARTMENT OF MATHEMATICS

Ma 162 Second Examv1 October 16, 2006

DO NOT TURN THIS PAGE UNTIL YOU ARE INSTRUCTED TO DO SO.

Instructions: Cell phones must be OFF and put away before you open this exam. **Be sure your name, section, and student number are filled in below. Also be sure to put your initials on each exam page.** There are 8 problems and 5 pages (including this one) on the exam.
Show your work and put your answers in the answer boxes provided. **Unsupported or misplaced answers will receive no credit and no partial credit will be given for an incorrect answer.** You may use calculators for completing numerical calculations. The test has been carefully checked and its notation is consistent with the homework problems. No additional details will be provided **during the exam.**

Problem	**Maximum Score**	**Actual Score**
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
Total	80	

Please fill in the information below.

NAME: ________________________________ **Section:** __________

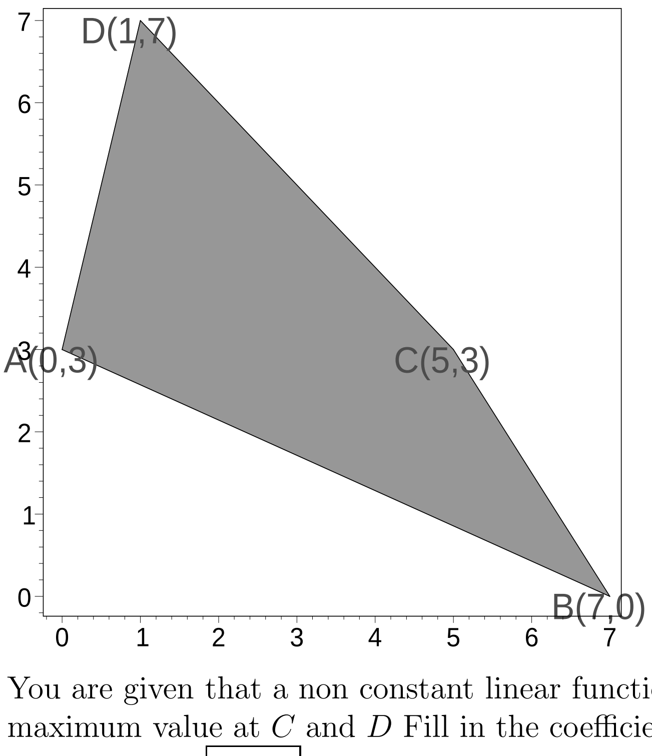
1. Carl's Carparts produces three types of parts: (L,M,N) using two machines I and II. Each part requires (4,5,3) units of work on machine I and (4,2,2) units of work on machine II respectively. Machine I and machine II have respectively (170,190) units of work available per day. It is given that the profits from the parts are: (6,8,6) dollars per part respectively. Assume that the production is given by x,y,z respectively and construct the following:

   The profit function to be maximized is:

   The restriction imposed by machine I is:

   The restriction imposed by machine II is:

2. Consider the regionABCDwith coordinates as shown in the diagram below.



   You are given that a non constant linear function of the form $f(x, y) = ay + bx$ has a maximum value at C and D Fill in the coefficient of x, if the function is known to be: $f(x, y) = y + \boxed{}\,x$.

3. i) Find the inequality describing the half-plane containing the origin $(0, 0)$ whose boundary is the line through $(11, 6)$ and $(-6, 11)$.

Answer: $\boxed{}$.

ii) Find the inequality describing the half-plane containing the origin $(0, 0)$ whose boundary is the line $y = 6\,x - 20$.

Answer: $\boxed{}$.

4. For the optimization problem:

Maximize $P = 2\,x + 5\,y + z$

Subject to:
$$\begin{cases} 0 \le x \\ 0 \le y \\ 0 \le z \\ 2\,x + 2\,y + z \le 100 \\ 4\,x + 2\,z \le 120 \\ 2\,y + 7\,z \le 130 \end{cases}$$

i) Fill in the initial tableau for this problem.

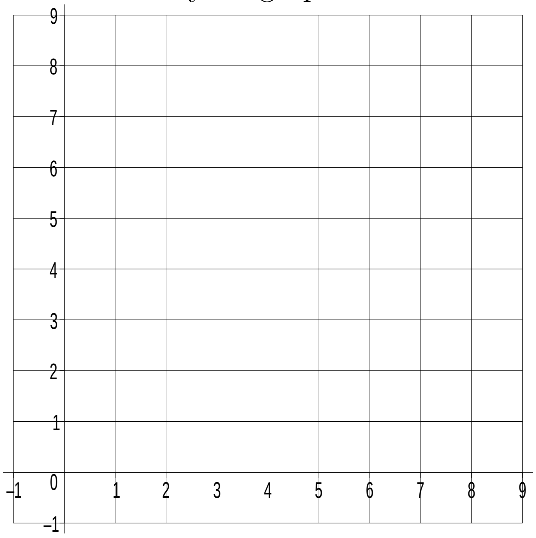
x	y	z	s	t	r	P	rhs
2			1	0	0	0	100
4		2			0	0	120
	2		0			0	
-2			0	0	0	1	

Use the simplex algorithm to determine the pivot column and row in the first iteration.

Pivot column: $\boxed{}$ Pivot row: $\boxed{}$

ii) Complete the last row of the tableau obtained after performing the pivot.

5. i) Sketch and shade the region described by the inequalities. Compute the coordinates of the corner points and mark them on your graph.



$$\begin{cases} 0 \leq x \\ 0 \leq y \\ 1/3\,x + 1/7\,y \leq 1 \\ 1/4\,x + 1/6\,y \leq 1 \end{cases}$$

ii) Find the maximum value of the function, $P = x + y$ on the region.

Answer: $P =$ $\boxed{}$ at $x =$ $\boxed{}$,$y =$ $\boxed{}$.

6. Each tableau below is a tableau of a maximization problem. In each case, decide whether the tableau is the final tableau or not, and if it is the final tableau, determine the maximum value of the objective function, putting "no maximum" if the objective function has no maximum value.

i)

x	y	u	v	w	P	*RHS*
1	0	4	-6	0	0	6
0	1	6	-3	0	0	4
0	0	-1	5	1	0	5
0	0	6	2	0	1	26

Final tableau? $\boxed{}$ If final, maximum is $\boxed{}$

ii)

x	y	u	v	w	P	*RHS*
5	0	1	-6	0	0	6
7	1	0	-3	0	0	4
0	0	0	5	1	0	5
-5	0	0	2	0	1	26

Final tableau? $\boxed{}$ If final, maximum is $\boxed{}$

7. i) Is the region described by the inequalities. $\begin{cases} 0 \le x \\ 0 \le y \\ y \le 40 + 7\,x \\ -40 + 6\,x \le y \end{cases}$ bounded or unbounded? Answer: $\boxed{}$

   ii) Does the objective function, $P = y - 6\,x$ have a maximum value on the region described by the inequalities above? Answer: $\boxed{}$

   iii) Does the objective function, $P = y - 8\,x$ have a maximum value on the region described by the inequalities above? Answer: $\boxed{}$

8. Set this problem up, and fill in the initial tableau of the simplex algorithm. **Do not solve the problem.**

   A farmer has 200 acres of land suitable for growing x acres of crop A and y acres of crop B. The cost of growing A is \$45/acre. The cost for B is \$65/acre.The farmer has \$7600 captial available. Each acre of A takes 30 hrs of labor and each acre of B takes 35 hrs of labor. The farmer has 3500 hrs of labor available. He expects to make \$150/acre for A and \$200/acre for B.

   Maximize: Profit $P =$

   Subject to:

   Initial tableau: