The following exam consists of 13 problems worth a total of 100 points. There are 6 multiple choice questions worth 5 points each. There are 7 work-out problems worth 10 points each. Partial credit will be awarded on the work-out problems, according to completeness of work.
If you do not show any work for a problem, you will not receive full credit (even if you answer is correct!).
Write the answers to each problem down in the space provided. Scratch work may done on the blank pages provided.

**Please answer the questions on the next page, BEFORE beginning the exam.**

You may begin the exam when the instructor indicates.
To improve instruction in this course, we are accumulating information about the study preparation and performance of MATH 166 students. Please answer as accurately as possible the questions that follow and those at the end of the exam. Your responses will be confidential. Any reference to this information will be group based, not individual specific. Thank you and good luck on the exam.

BEFORE beginning the exam, please answer the questions below:

MATH 166 EXAM 2A SPRING 1999

Student ID: _______________________

1. APPROXIMATELY how many hours did you spend studying for this MATH 166 exam? _______ hours

2. What goal do you have for your score (%) on this test? _______ %

3. How many sample exams did you use to practice for this exam. Include any on-line exams and exams from similar classes _______

4. Which of the resources listed below have you used this semester? Please check all that apply:
   _____ Attended the on-campus evening Exam Review
   _____ Attended the on-campus evening Weekly Reviews
   _____ Attended the on-campus Help Session
   _____ Used a private tutor
   _____ Used an off-campus tutoring service (such as 4.0 & Go)
   _____ Used my instructor’s office hours
   _____ Took the online practice test

COMPLETE THE QUESTIONS BELOW WHEN YOU HAVE FINISHED THE EXAM

5. What total score (%) do you think you received on this test? _______ %

6. How satisfied would you be with that score?
   Use the scale of 1 to 6 with 1 = not at all satisfied to 6=very satisfied
   ______

7. If you took the online practice test, how well do you think it prepared you for this exam? Use the scale of 1 to 6 with 1 = not at all satisfied to 6=very satisfied
   ____________
1. The maximum value of the function \( P = 2x - 3y \) subject to the following constraints

\[
\begin{align*}
y & \leq x + 1 \\
x + y & \leq 2 \\
x & \geq 0 \\
y & \geq 0
\end{align*}
\]

is given by

A) 1  B) -3  C) 4  D) 0  E) none of these

2. If \( x \in A \cup (B \cap C) \) then which of the following is true

a) \( x \) is in \( A \) and \( B \) but not in \( C \)
b) \( x \) is in \( A \) and \( B \) and \( C \)
c) \( x \) is in either \( B \) or \( C \) and \( A \)
d) \( x \) is in \( A \) or \( B \) or \( C \)
e) none of the above

3. True or False. If \( A \cap B = \emptyset \) and \( B \cap C = \emptyset \) then \( A \cap C = \emptyset \).

(A) True  (B) False

4. Let \( U \) be the set \( \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\} \), and \( A, B, C \) be the sets \( \{1, 2, 3\}, \{3, 4, 5\}, \{2, 4, 6\} \) respectively. The set \( (A \cap B^c) \cup C \) is given by

A) \( \{1, 2, 4, 6\} \)  B) \( \{1, 2, 3, 4, 5, 6\} \)  C) \( \{2, 4, 6\} \)  D) \( \{1, 2, 3, 4\} \)  E) none of these

5. At SBISA Dining Hall, 300 students ate breakfast, 500 students at lunch and 400 students ate dinner. 200 students ate both breakfast and lunch, 100 students ate both breakfast and dinner, and 250 students ate both lunch and dinner. Furthermore, 50 students ate all three meals. If every student at SBISA ate at least one meal, how many students were there that day?

A) 900  B) 1200  C) 1000  D) 700  E) none of these

6. A straight flush consists of 5 cards in a row of the same suit. In a standard 52 card deck, how many such hands are there?

A) \( C(4, 1) \times 11 \)  B) \( C(4, 1) \times 10 \)  C) 4  D) \( 4! \times 11! \)  E) none of these
7. A company manufactures products A, B, and C. Each product is processed in three departments: I, II, and III. The total available labor hours per week for departments I, II, and III are 1000, 1200, and 1100 hours respectively. The time requirements (in hours/unit) and profit (dollars/unit) are given by the table below:

<table>
<thead>
<tr>
<th></th>
<th>Product A</th>
<th>Product B</th>
<th>Product C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant I</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Plant II</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Plant III</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Profit</td>
<td>18</td>
<td>20</td>
<td>22</td>
</tr>
</tbody>
</table>

How many units of each product should the company produce in order to maximize its profit? Write down the linear programming problem associated with this problem, but do not solve it!

8. Maximize the function $P = x + y$ subject to the following inequalities

$$
\begin{align*}
x + 2y & \geq 4 \\
2x + 3y & \leq 12 \\
x & \geq 0 \\
y & \geq 0
\end{align*}
$$

a) Find all the vertices

b) Find the maximum of P by the method of corners

9. If the set $A$ has twice as many elements as the set $B$, and if $n(A \cup B) = 20$ and $n(A \cap B) = 10$, how many elements are in sets $A$ and $B$?
10. Passwords at the TAMU computing center are formed from 3 letters (initials of the student) and 4 digits (last four digits of student id).
   a) How many such passwords are there?

   b) If students are given the number 0 if they lack a middle name, how many additional passwords are there?

11. An English teacher is covering three different types of literature areas in class during a 6 week semester. There are 3 books available for the first category, 4 books in the second, and 2 books in the third.
   a) If she choose one book from each section, how many different syllabi can she form?

   b) If she is free to choose the order of the topics, how many syllabi are there?

12. Three coins and one dice are thrown on a table. List the events where the number of heads exceeds the value of the die.

13. In a high school, juniors and senior taking the SAT were distributed according to the following table

<table>
<thead>
<tr>
<th>Range</th>
<th>SAT scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>[200, 300]</td>
<td>40</td>
</tr>
<tr>
<td>(300, 400]</td>
<td>300</td>
</tr>
<tr>
<td>(400, 500]</td>
<td>600</td>
</tr>
<tr>
<td>(500, 600]</td>
<td>700</td>
</tr>
<tr>
<td>(600, 700]</td>
<td>400</td>
</tr>
<tr>
<td>(700, 800]</td>
<td>200</td>
</tr>
</tbody>
</table>

   a) Find the probability distribution for the SAT scores.

   b) What is the probability that a student chosen at random (from the junior and senior class) will have an SAT scoring less than or equal to 500 on the SAT?