

Math 141  
Exam 2 VERSION A  
October 24, 1997

Name \_\_\_\_\_  
Roster Number \_\_\_\_\_  
Section \_\_\_\_\_ SEAT \_\_\_\_\_

M.C.	
1	
2	
3	
4	
TOTAL	

The work on this exam is my own \_\_\_\_\_  
(signature required)

Please read all directions.

There are 3 pages with writing on both sides of every page.

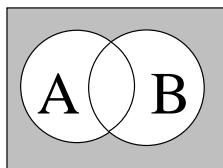
When you are done, put your exam and scantron in your envelope.

There is a five point deduction for any error in your name, roster number, section number, version letter (on your scantron) or missing signature. There is a 10 point deduction if I have to grade the scantron by hand.

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PUT YOUR NAME AND VERSION LETTER (A) ON YOUR SCANTRON!

There are 11 multiple choice questions to answer on your scantron. There is no partial credit on this part. The scantrons will not be returned, so please mark your answers on the exam too.



1. Express the shaded region in set notation:

- (A)  $A \cup B$       (B)  $A \cap B$       (C)  $(A \cup B)^c$       (D)  $(A \cap B)^c$       (E) none of the above

2. A class of math students can be grouped in the following sets:

$$A = \{x|x \text{ is a woman}\} \quad B = \{x|x \text{ has taken Economics}\}$$

Find the set of men who have taken Economics

- (A)  $\{x|x \notin A \text{ and } x \notin B\}$       (B)  $\{x|x \notin A \text{ and } x \in B\}$       (C)  $\{x|x \notin A \text{ or } x \notin B\}$   
(D)  $\{x|x \notin A \text{ or } x \in B\}$       (E) none of the above

3. A store has sold 100 microwaves. 80 of the microwaves have turntables and 40 of them have programs. If 90 of them have programs or turntables, how many have only programs?

- (A) 10      (B) 20      (C) 30      (D) 40      (E) none of the above

4. A pizza place has 15 different toppings available for pizza. How many different 2 item pizzas are possible?

- (A) 29      (B) 30      (C) 105      (D) 210      (E) 225

5. How many different “words” can be made from the letters *COLLEGE*? You must use all the letters, but the “word” does not need to make sense.

- (A) 5040      (B) 2520      (C) 1260      (D) 210      (E) none of the above

6. You are dealt 2 cards. How many ways can you be dealt a blackjack? (that is, a sum of 21 where an ace is worth 1 and a 10 and face cards are worth 10).

- (A) 20      (B) 48      (C) 64      (D) 1326      (E) none of the above

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7. From a class of 20 students a committee of 5 is chosen. One person on the committee is the chair and the others are the members. How many different committees can be chosen?
- (A) 372096      (B) 1860480      (C) 15504      (D) 77520      (E) none of the above
8. You have 5 different yellow books and 5 different green books. How many ways can the books be arranged on the shelf if the colors must alternate?
- (A) 14400      (B) 3628800      (C) 240      (D) 28800      (E) none of the above
9. You have a bag of jelly beans. There are 4 blue, 3 orange and 2 pink jelly beans. A sample of 3 is chosen. How many ways to have at least one blue in the sample?
- (A) 40      (B) 74      (C) 14      (D) 30      (E) none of the above
10. You do the following experiment: Choose a card and note the color. Then roll a dice and note the number showing. How many outcomes in the sample space for this experiment?
- (A) 2      (B) 6      (C) 8      (D) 12      (E) none of the above
11. You have a cup with bronze, steel and nickel coins. You choose one from the bowl. How many events are possible?
- (A) 3      (B) 5      (C) 6      (D) 7      (E) 8

WORK-OUT PROBLEMS (credit as shown) Be sure your work is legible if you want credit.

1. (10 points) For each of the tableaus below, pick one of the following options. Each option may be used more than once or not at all. Look at the tableau to decide what it is.

(A) Simplex is done. Write the values of all the variables under the tableau.

(B) More pivot operations are required. Circle the pivot element (do not pivot).

(C) The problem has no solution

$$\text{---} \left( \begin{array}{ccccc|c} x & y & u & v & f & \\ 2 & 0 & 1 & 3 & 0 & 12 \\ 3 & 1 & 0 & -3 & 0 & 15 \\ 4 & 0 & 0 & 4 & 1 & 20 \end{array} \right)$$

$$\text{---} \left( \begin{array}{ccccc|c} x & y & u & v & f & \\ -2 & 1 & 0 & 3 & 0 & 5 \\ 0 & 0 & 1 & 4 & 0 & 4 \\ -5 & 0 & 0 & 7 & 1 & 2 \end{array} \right)$$

$$\text{---} \left( \begin{array}{ccccc|c} x & y & u & v & f & \\ 2 & 7 & 1 & 0 & 0 & 4 \\ 0 & 2 & 0 & 1 & 0 & 1 \\ -6 & 1 & 0 & 0 & 1 & 0 \end{array} \right)$$

$$\text{---} \left( \begin{array}{ccccc|c} x & y & u & v & f & \\ 1 & 2 & 0 & 6 & 0 & 0 \\ 0 & 3 & 1 & 3 & 0 & 1 \\ 0 & -4 & 0 & 2 & 1 & 7 \end{array} \right)$$

$$\text{---} \left( \begin{array}{ccccc|c} x & y & u & v & f & \\ 1 & 1 & -2 & 0 & 0 & 10 \\ 0 & 0 & 1 & 1 & 0 & 4 \\ 0 & 0 & 4 & 0 & 1 & 6 \end{array} \right)$$

2. (10 points) BeeStar company makes teddy bears. Each Baby Bear requires 1 unit of material, 2 units of decorating and 1 unit of packing. Each Mamma Bear requires 1.5 units of material, 2 units of decorating and 1 unit of packing. Each Papa Bear requires 2 units of material, 1 unit of decorating and 2 units of packing. The profit on each Baby Bear is \$6, on each Mamma bear is \$8 and on each Papa bear is \$7. If there are 600 units of material, 500 units of decorating and 400 units of packing available each day, how many of each kind of bear should be made to maximize profits?

The initial and final tableaus are given - you do not need to do the pivots. Fully explain the answer in the final tableau.

$$\left[ \begin{array}{cccccc|c} x & y & z & u & v & w & P \\ 1 & 1.5 & 2 & 1 & 0 & 0 & 600 \\ 2 & 2 & 1 & 0 & 1 & 0 & 500 \\ 1 & 1 & 2 & 0 & 0 & 0 & 400 \\ -6 & -8 & -7 & 0 & 0 & 0 & 1 & 0 \end{array} \right]$$

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$$\left[ \begin{array}{cccccc|c} x & y & z & u & v & w & P \\ -0.5 & 0 & 0 & 1 & -1/3 & -5/6 & 0 & 100 \\ 1 & 1 & 0 & 0 & 2/3 & -1/3 & 0 & 200 \\ 0 & 0 & 1 & 0 & -1/3 & 2/3 & 0 & 100 \\ 2 & 0 & 0 & 0 & 3 & 2 & 1 & 2300 \end{array} \right]$$

3. (15 points) BeeStar company makes deluxe toy wagons out of wood and steel. A wagon cannot contain more than 20 units of wood and no more than 10 units of steel and must weigh at least 10 pounds. If each unit of steel costs \$4 and weighs 2 pounds and each unit of wood costs \$2 and weighs 1 pound, how much steel and wood should be used to make a wagon if the cost is to be minimized? Be sure to set up the system of equations to be solved and show ALL your work for full credit. An answer with no work shown is worth nothing.

4. (10 points) A survey of 200 students is done at a school cafeteria.

$A$  is the set of students who liked fish sticks.

$B$  is the set of students who liked hamburgers.

$C$  is the set of students who liked chicken nuggets.

Use the information given to fill in the Venn diagram:

60 students like hamburgers and fish sticks.

110 students did not like chicken nuggets.

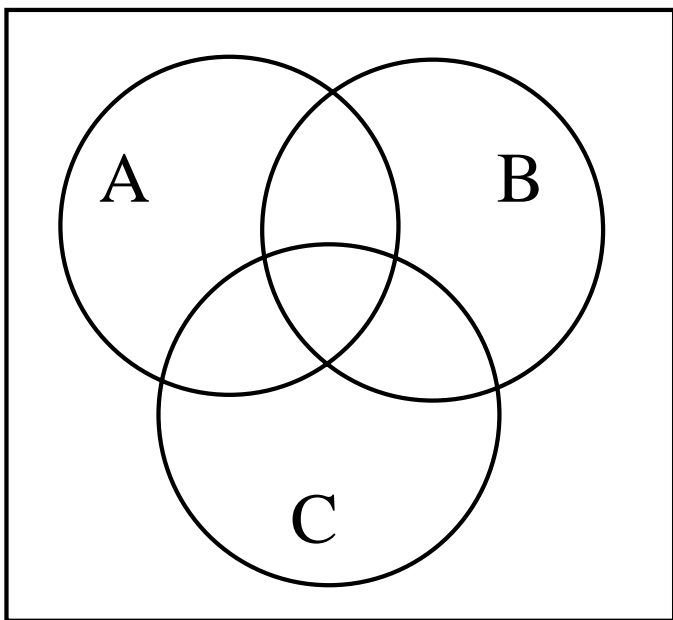
20 students like all three items.

65 students like hamburgers but did not like chicken nuggets.

5 students like only fish sticks.

75 students like exactly 2 of these dishes.

10 students like chicken nuggets and fish sticks but not hamburgers.



Express “liked exactly two of these dishes” in set notation.