MATH 1711, Midterm 1

09/11/2013

Name: Key GTID:_____

Circle your section below

D1 TA: Katie Stocker

D2 TA: Maggie Ginn

D3 TA: Kayla McKenzie

Problem No.	Points
1	
2	
3	
4	
5	
6	
7	

TOTAL:_____

Please do show all your work including intermediate steps. Partial credit is available.

Problem 1 (5+5+5+5 points).

Simplify the following expressions as far as possible.

1. $P(5,4)$

$= 5 \cdot 4 \cdot 3 \cdot 2 = 120$

2. $C(5,4)$

$= \frac{5!}{4!\,1!} = 5$

3. $\binom{5}{4}$

$= \frac{5!}{4!\,1!} = 5$

4. $\binom{6}{3,2,1}$

$= \frac{6!}{3!\,2!\,1!} = \frac{6 \cdot 5 \cdot 4^{2}}{8} = 60$

Turn over for more problems

Problem 2 (10 points).

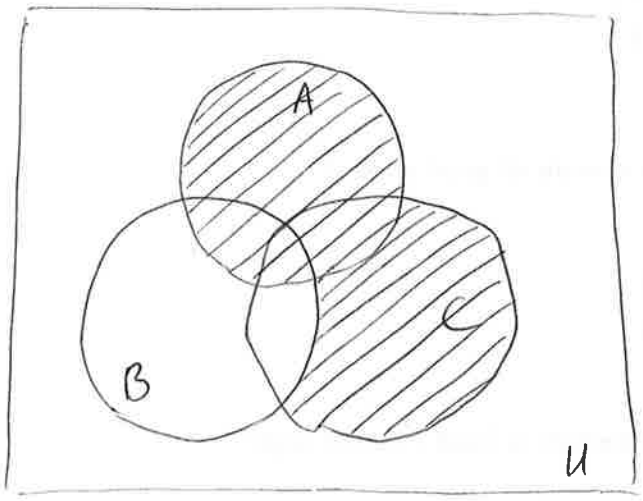
Determine the coefficient of x^2y^3 in the binomial expansion of $(x-y)^5$. Simplify your answer as far as possible.

$$\binom{5}{2}(-1)^3$$

$$= -10$$

Problem 3 (10 points).

Draw a three-circle Venn diagram and shade the portion corresponding to the set $A \cup (B' \cap C)$.



Turn over for more problems

Problem 4 (15 points).

You draw out an 8-card hand from a standard deck of 52 cards. In how many ways can your hand contain one three-of-a-kind, two pairs, and one single card? You do *not* need to simplify your final answer.

$$\binom{13}{1} \cdot \binom{12}{2} \cdot \binom{10}{1} \cdot \binom{4}{3} \cdot \binom{4}{2}^2 \cdot \binom{4}{1}$$

Problem 5 (5+5+5 points).

A bag of 10 apples contains 3 rotten apples and 7 good apples. A shopper selects a sample of 3 apples from the bag. You do *not* need to simplify your final answer.

1. How many different samples are possible?

$$\binom{10}{3}$$

2. How many samples contain all good apples?

$$\binom{7}{3}$$

3. How many samples contain at least 1 rotten apple?

$$\binom{10}{3} - \binom{7}{3}$$

or $\binom{3}{1}\binom{7}{2} + \binom{3}{2}\binom{7}{1} + \binom{3}{3}$

Turn over for more problems

Problem 6 (15 points).

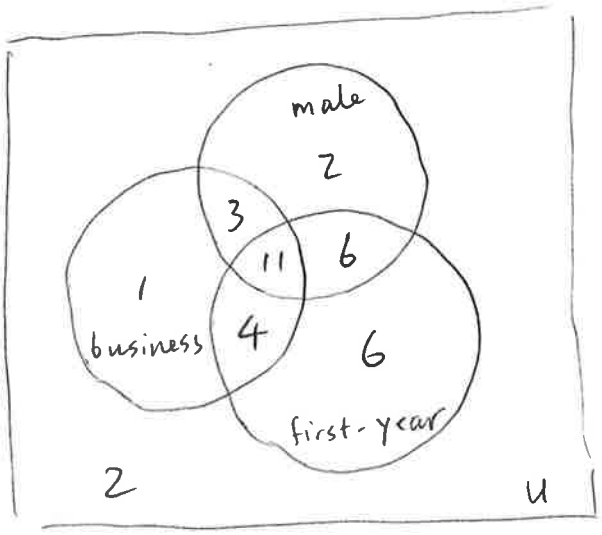
In how many ways can the letters in the word SUPPLEMENT be arranged? You may leave your answer as a product of integers.

$$\binom{10}{2,2,1,1,1,1,1,1} = \frac{10!}{2!\,2!}$$

$$= 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 3 \cdot 2$$

Problem 7 (15 points).

Out of 35 students in a finite math class, 22 are male, 19 are business majors, 27 are first-year students, 14 are male business majors, 17 are male first-year students, 15 are first-year students who are business majors, and 11 are male first-year business majors. How many female business majors are in the class?



Ans = 1 + 4 = 5

The End.

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