Answers

Math 107 Sec. 2
Montgomery
October 12, 2007 Exam 2

1. (20 pts.) U is the set of all 26 letters in the alphabet.
A = {a, e, i, o, u}, B = {a, b, c, … ,m}, C={washingto}
a) (A' ∪ C)' = A ∩ C' = vowels not in "washington".

$= \{e\ u\}$

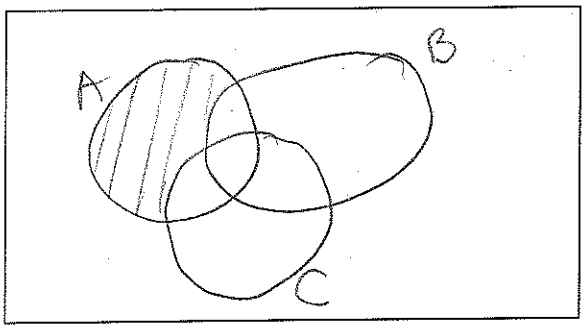
b) B' ∩ (A ∪ C)

$B' \cap \{a\ e\ i\ o\ u\ w\ s\ h\ n\ g\ t\}$

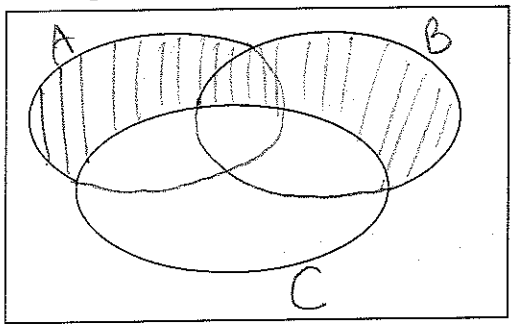
$= \{o, u, w, s, n, t\}$

2. (10 pts) In a survey, students were asked if they liked apples, if they liked bananas, and if they liked cherries.

a. Draw a Venn diagram that could be used to represent the results of the survey, and shade the area that would represent the students who liked apples but not bananas or cherries.



b. What people are represented by the shaded area below. Represent the set in symbols.



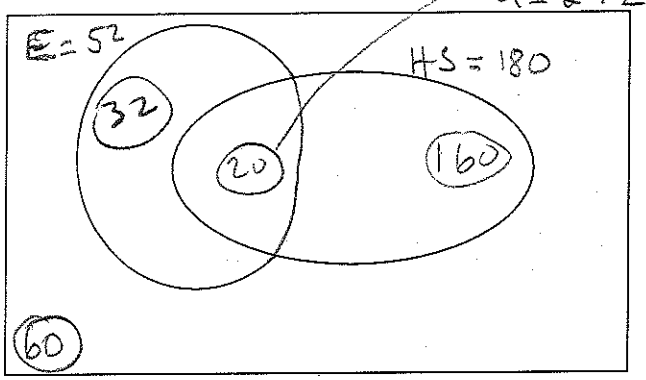
$C' \cap (A \cup B)$

Those who don't like cherries but do like Apples or Bananas.

3. (15 pts) 272 employed US citizens over 40 years of age were randomly chosen. 52 of them were upper level executives. 180 of the 272 people played on high school teams in some sport. 60 of the 272 were not upper level executives and did not play on high school teams.

a. How many upper level executives played HS sports? 20

b. How many are either executives or played sports? 212



272 − 60 = 212

232 − 212 = 20

180 + 52 = 232

Bonus: Does this data set support the contention that someone who plays HS sports does better in business? (Brief answer--compare two proportions.)

19% = 20/180 = proportion of executives in the HS sports population.

19% = 52/272 = proportion of executives in Total population

NO.

4. (15 pts) The days of the year are numbered from 1 to 365. (Disregard leap years) 5 people are chosen at random and their birthdays recorded. (Do not compute the answers below.)

a. How many outcomes are possible?

$\underbrace{365 \times \ldots \times 365}_{5 \text{ factors}} = 365^5$

b. How many outcomes are possible if all the birthdays are different?

$365 \times 364 \times 363 \times 362 \times 361$

c. How many outcomes have at least two people with the same birthday? (i.e.,the birthdays are not all different.)

(Answer in a) − answer in (b)

5. (20 pts) Show factors, cancel and compute:

a. ${}_{28}C_5 = \frac{28\,27\,26\,25\,24}{5\,4\,3\,2\,1} = 28\times27\times26\times5 = 98,280$

b. ${}_{9}P_5 = 9\times8\times7\times6\times5 = 15,120$

c. ${}_{14}C_{10}\times{}_{7}C_3 = \frac{14\,13\,12\,11\,10\,9\,8\,7\,6\,5}{10\,9\,8\,7\,6\,5\times4\,3\,2\,1}\times\frac{7\,6\,5}{3\,2\,1} = 7\cdot13\cdot11\cdot7\cdot5 = 35,035$

6. (20 pts) Andrea owns an automobile dealership and needs to reduce her inventory. She needs to sell 22 of her 185 cars very quickly by reducing the price.

a. She needs to decide which of the cars will have the price reductions. In how many ways can she do this? (Don't compute the answer.)

$185C22$

b. b. She has 45 SUV's and 9 convertibles on the lot; the rest are sedans. She has decided that 8 SUV's, 2 convertibles, and 11 sedans will go on sale. In how many ways can she choose the cars to go on sale? (Don't compute the answer.)

$45C8 \times 9C2 \times 131C11$ $\quad 185-(45+9)=131$ sedans

c. 5 of the 22 cars on sale must be chosen to go on display. One will be in the showroom near the entrance, one will be in the middle of the showroom, and one in the back. Another will be at the entrance to the parking lot, and the last will be near the street in front of the office. In how many ways can these cars be chosen and arranged in this way? (Don't compute the answer.)

$22P5$