

Fun Number Jeopardy
(a.k.a. Math4010 Midterm 1 Review)

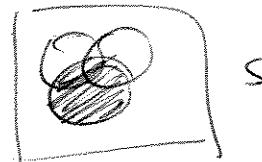
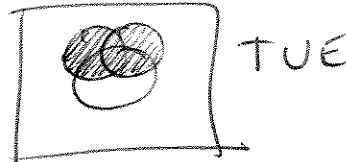
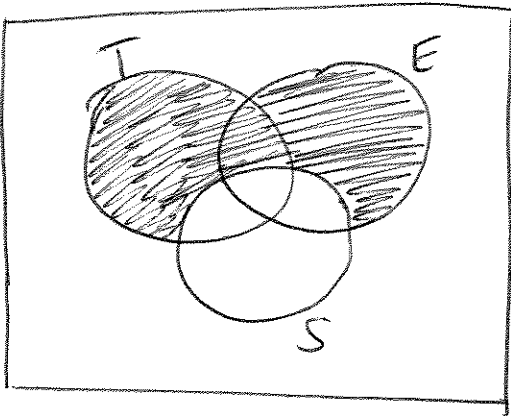
Sets/Venn Diagrams

10 points-- List all subsets of {m, a, t, h}.

\emptyset , {m}, {a}, {t}, {h}, {m,a}, {m,t},
{m,h}, {a,t}, {a,h}, {t,h}, {m,a,t}, {m,a,h},
{m,t,h}, {a,t,h}, {m,a,t,h}

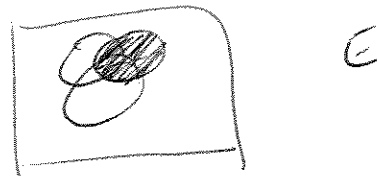
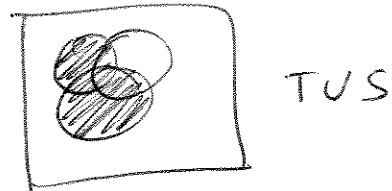
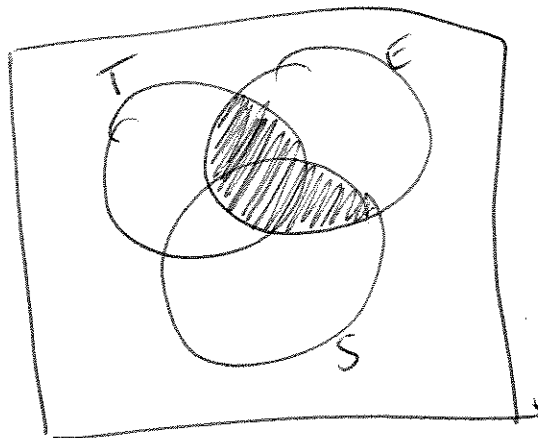
Let T = the set of trumpet players, S = the set of sophomores, and E = the set of kids who excel in mathematics.

20 points—Shade in $(T \cup E) - S$ and describe that set in words.



the set of kids who are trumpet players or excel in math but who are not sophomores

30 points-- Shade in $(T \cup S) \cap E$ and describe that set in words.



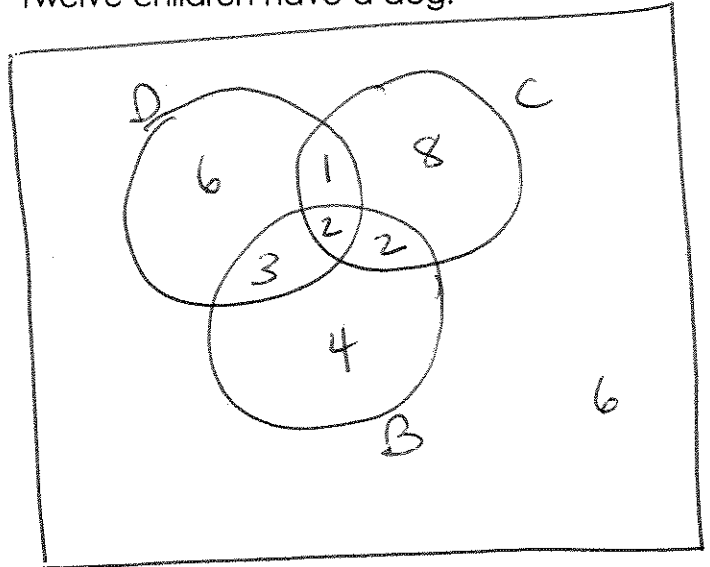
the kids who excel in math and are either trumpet players or sophomores

Sets/Venn Diagrams (continued)

40 points-- Fill in the Venn Diagram with the following information:
 In a group of 30 kids, 10 have a cat but not a dog. Six children have no animals at all. Three own a cat and a dog. Four kids own only a bird. Two kids have all three pets. Six children have a bird, but not a dog, and five have a dog and a bird. Twelve children have a dog.

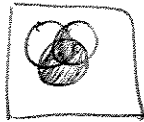
C = cat D = dog B = bird

- ③ ✓ 10 C not D
- ③ ✓ 6 none
- ③ ✓ 3 C and D
- ② ✓ 4 B only
- ② ✓ 2 B and C and D
- ③ ✓ 6 B not D
- ② ✓ 5 D and B
- ⑥ ✓ 12 D



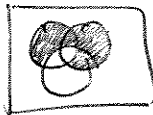
50 points—For the above Venn Diagram, how many kids are in each of these sets?

(a) $(D \cap C) \cup B$

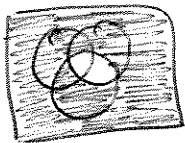


$1 + 2 + 3 + 2 + 4 = 12$

(b) $(D \cup C) - (D \cap B)$



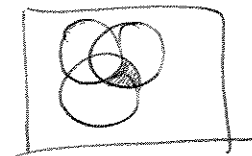
$6 + 1 + 8 + 2 = 17$



(c) $\overline{B} \cup \overline{C}$

$6 + 1 + 8 + 3 + 4 + 6 = 28$

(d) $(B \cap C) - D$



2

Number Systems

10 points—Write 34 with the Tally System.

|||| | |||| | |||| | |||| | |||| | |||| | ||||

20 points—How many symbols/numerals are needed for a base 15 number system?

15

30 points—Write ~~3419~~³⁴¹⁹ with the Roman Numeral System.

MMMCDXIX

40 points—Write 513 using the Mayan Number System.

• 1
— 5
⊖ 0

$$513 = 1(360) + 7(20) + 13(1)$$

$$\begin{array}{r} 513 \\ -360 \\ \hline 153 \\ -140 \\ \hline 13 \end{array}$$

$$18 \cdot 20^2 = 7200$$

$$18 \cdot 20 = 360$$

20
1

1 { •
7 { —••
13 { —•••

3

Number Systems (continued)

50 points—Convert 281 to base 5.

base 5
625 125 25 5 1

$$281 = 2(125) + 1(25) + 1(5) + 1(1)$$

$$= 2111_5$$

$$\begin{array}{r} 281 \\ -250 \\ \hline 31 \\ -25 \\ \hline 6 \\ -5 \\ \hline 1 \end{array}$$

60 points—Convert 3167 to base 8.

base 8

4096 512 64 8 1

$$\begin{array}{r} 512 \\ \underline{5} \\ 2560 \end{array}$$

$$\begin{array}{r} 2560 \\ +512 \\ \hline 3072 \end{array}$$

$$\begin{array}{r} 3167 \\ -3072 \\ \hline 95 \\ -64 \\ \hline 31 \\ -24 \\ \hline 7 \end{array}$$

$$3167 = 6(512) + 1(64) + 3(8) + 7(1)$$

$$= 6137_8$$

70 points—Convert 111 to base 2.

base 2

128 64 32 16 8 4 2 1

$$\begin{array}{r} 111 \\ -64 \\ \hline 47 \\ -32 \\ \hline 15 \\ -8 \\ \hline 7 \\ -4 \\ \hline 3 \end{array}$$

$$111 = 1(64) + 1(32) + 0(16) + 1(8) + 1(4) + 1(2) + 1(1)$$

$$= 1101111_2$$

Number Systems (continued)

80 points—Convert 10211102_3 to base 10.

base 3

$$\underline{2187} \quad \underline{729} \quad \underline{243} \quad \underline{81} \quad \underline{27} \quad \underline{9} \quad \underline{3} \quad \underline{1}$$

$$= 2(87) + 4(86) + 81 + 27 + 9 + 2$$

$$= \boxed{2792}$$

$$10211102_3$$

$$= 1(2187) + 0(729)$$

$$+ 2(243) + 1(81)$$

$$+ 1(27) + 1(9)$$

$$+ 0(3) + 2(1)$$

90 points—Convert 43501_6 to base 10.

base 6

$$\underline{1296} \quad \underline{216} \quad \underline{36} \quad \underline{6} \quad \underline{1}$$

$$43501_6 = 4(1296) + 3(216)$$

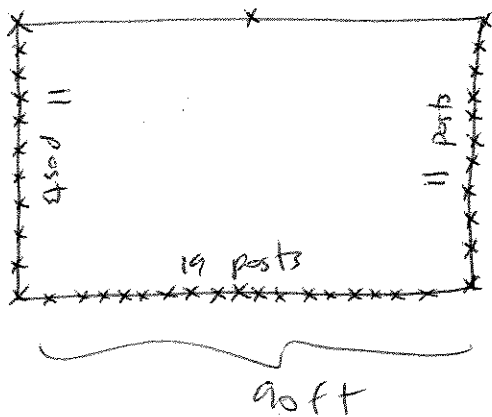
$$+ 5(36) + 0(6) + 1(1)$$

$$= 5184 + 648 + 180 + 1$$

$$= \boxed{6013}$$

Problem Solving

10 points—If a fence requires a post every 5 feet, how many posts are required for a fence that encloses a 90 ft. by 50 ft. area of land?



$19 + 11 + 19 + 11$ posts
 but that's counting
 each corner post
 twice
 $\Rightarrow 19 + 11 + 19 + 11 - 4$
 $= 60 - 4 = 56$

20 points—In three years, Mary will be three times my present age. I will then be half as old as she. How old am I now?

$x = \text{my present age}$ $m = \text{Mary's age now}$

$m + 3 = 3x$ $x + 3 = \frac{1}{2}(m + 3)$
 $\rightarrow x + 3 = \frac{1}{2}(3x)$

$x + 3 = \frac{3}{2}x$

$3 = \frac{1}{2}x$

$6 = x \Rightarrow m + 3 = 3(6) \Rightarrow m = 15$

I am 6 yrs old now.

30 points—A letter was posted that was covered with 10-cent and 5-cent stamps. There were 12 stamps altogether, and the total postage was 70 cents. How many of each stamp were on the letter?

$x = \# \text{ 10¢ stamps}$ $y = \# \text{ 5¢ stamps}$

$x + y = 12$

$y = 12 - x$

$10x + 5y = 70$

$\rightarrow 10x + 5(12 - x) = 70$

$10x + 60 - 5x = 70$

$5x = 10$

$x = 2$

$\Rightarrow y = 10$

2 10¢ stamps
10 5¢ stamps

Problem Solving (continued)

40 points—A certain type of tubing comes in lengths of 6-ft., 8-ft., and 10-ft. sections. How many different lengths can be formed using 4 sections of tubing?

$$\begin{aligned}
 6+6+6+6 &= 24 \\
 6+6+6+8 &= 26 \\
 6+6+6+10 &= 28 \\
 6+6+8+8 &= 28 \\
 6+6+8+10 &= 30 \\
 6+6+10+10 &= 32 \\
 6+8+8+8 &= 30
 \end{aligned}$$

$$\begin{aligned}
 6+8+8+10 &= 32 \\
 6+8+10+10 &= 34 \\
 6+10+10+10 &= 36 \\
 8+8+8+8 &= 32 \\
 8+8+8+10 &= 34 \\
 8+8+10+10 &= 36 \\
 8+10+10+10 &= 38 \\
 10+10+10+10 &= 40
 \end{aligned}$$

9 different lengths

50 points—Two friends are shopping together when they encounter a special "3 for 2" shoe sale. If they purchase two pairs of shoes at the regular price, a third pair (of lower or equal value) will be free. Neither friend wants three pairs of shoes, but Pat would like to buy a \$56 and a \$39 pair of shoes while Chris is interested in a \$45 pair. If they buy the shoes together to take advantage of the sale, what is the fairest share for each to pay?

Pat $\begin{cases} \$56 \\ \$39 \end{cases}$
Chris \$45

they pay $56+45 = \$101$

Chris $\frac{45}{140} = 0.32$

Pat 0.68

total \$140
value

$$\begin{aligned}
 0.32(101) &= \$32.32 \text{ Chris} \\
 0.68(101) &= \$68.68 \text{ Pat}
 \end{aligned}$$

60 points—There are six baseball teams in a tournament. The teams are lettered A through F. Each team plays each of the other teams twice. How many games are played altogether?

- AB BC CD DE EF
- AC BD CE DF
- AD BE CF
- AE BF
- AF

$5 + 4 + 3 + 2 + 1 = 15$ to each play every team once \Rightarrow to play each team twice means 30 games