Math 200 - Test 2

October 17, 2012

Name key

Score _____

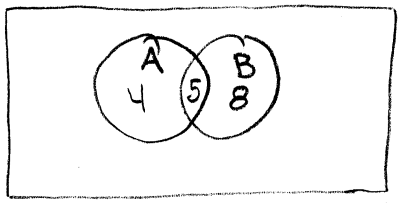
Show all work to receive full credit. Supply explanations where necessary.

1. (1 point) Suppose A and B are sets such that $n(A) = 9$, $n(A \cup B) = 17$, and $n(A \cap B) = 5$. Find $n(B)$.

   (a) 8
   (b) 13
   (c) 4
   (d) 12

   Elements in B ?

   5 + 8 = 13



   4 + 5 + □ = 17

   □ = 8

2. (1 point) When counting in base seven, which numeral immediately follows 566_{seven}?

   (a) 600_{seven}
   (b) 567_{seven}
   (c) 570_{seven}
   (d) 666_{seven}

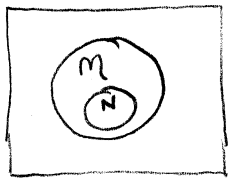
3. (1 point) Choose the subtraction model that best fits the following problem situation: *Sarah's grocery bill came to \$17. If she paid with a \$20 bill, how much change should she get get?*

   (a) comparison model
   (b) take-away model
   (c) set partition model
   (d) missing addend model

   How much more ?

4. (1 point) Suppose M and N are sets such that $N \subseteq M$. Which one of these is the simplest way to write $M \cap N$?

   (a) M
   (b) N
   (c) $\emptyset$
   (d) $\overline{M \cup N}$



   $M \cap N = N$

5. (1 point) Which one of these illustrates the commutative property of addition?

   (a) $6 + 7 = 6 + 7$
   (b) $(x + 4) + 8 = x + (4 + 8)$
   (c) $(3 + x) + (4 + y) = (4 + y) + (3 + x)$
   (d) $26 + 0 = 26$

6. (4 points) Think about the strategies that we studied for mastering basic addition facts. Of those strategies, use a different one to compute each sum below. Show work or explain your reasoning.

(a) $9+3$ MAKE 10...

$9+3 = 9+1+2 = 10+2 = 12$

(b) $6+5$ DOUBLES...

$6+5 = 1+5+5 = 1+10 = 11$

7. (3 points) Convert 1888 to base nine.

$9^0 = 1, 9^1 = 9, 9^2 = 81,$

$9^3 = 729$

$1888 = 2527_{NINE}$

$9^3 = 729 \overline{)1888} \; 2$ (-1458)

$9^2 = 81 \overline{)430} \; 5$ (-405)

$9^1 = 9 \overline{)25} \; 2$ (-18)

$9^0 = 1 \overline{)7} \; 7$ (-7)

0

8. (3 points) Suppose A and B are sets such that $n(A) = 9$ and $n(B) = 11$.

(a) Find $n(A \times B)$.

$= n(A) \times n(B) = 9 \times 11 = 99$

(b) Is it true that $A \times B = B \times A$? Explain.

No! THE ORDERED PAIRS IN $A \times B$ ARE BACKWARDS WHEN COMPARED TO THOSE IN $B \times A$.

(c) Determine $A \times \emptyset$.

$A \times \emptyset = \emptyset$

9. (1 point) Let U be the set of all PSC students, let B be the set of students who gave blood Monday, and let S be the set of all students who fell asleep in class Monday. Which one of the following is describes an element of $B - \overline{S}$?

$B - \overline{S} = B \cap S$

(a) a student who gave blood and fell asleep in class

(b) a student who gave blood but did not fall asleep in class

(c) a student who gave blood or fell asleep in class

(d) a student who fell asleep in class but did not give blood

10. (1 point) Choose the subtraction model that best fits the following problem situation: *Al has 9 books and Betty has 4 books. How many more books does Al have than Betty?*

(a) comparison model

(b) take-away model

(c) set partition model

(d) missing addend model

11. (1 point) What is the **place value** of the digit 7 in the numeral $TE742_{\text{twelve}}$?

12^0
12^1
12^2

$12^2 = 144$

(a) 7

(b) 100

(c) 144

(d) 1008

12. (1 point) Which sets could be used to illustrate $3 + 4 = 7$ with the set model of addition?

(a) $A = \{a, b, c\}, \quad B = \{a, b, c, d\}$

(b) $A = \{a, b, c\}, \quad B = \{d, e, f, g, h\}$

(c) $A = \{a, b, c\}, \quad B = \{w, x, y, z\}$

(d) $A = \{a, b, c\}, \quad B = \{c, d, e, f, g\}$

13. (1 point) Let $A = \{x, y, z, \pi, \phi\}$ and $B = \{3, 8, y, \phi\}$. Which one of the following represents $n(A - B)$?

$A - B = \{x, z, \pi\}$

(a) 2

(b) 3

(c) 1

(d) -1

14. (2 points) Shade the region of a three-set Venn diagram corresponding to $(A \cup B) \cap \overline{C}$.

$(A \cup B) \cap \overline{C}$ IS SAME AS

$(A \cup B) - C$. SEE ATTACHED VENN DIAGRAM.

15. (5 points) A number of herpetologists were asked to name their favorite lizards. Here are their responses:

- 27 said geckos
- 32 said monitors
- 29 said iguanas
- 16 said geckos and monitors
- 9 said monitors and iguanas
- 10 said geckos and iguanas
- 2 said geckos, monitors, and iguanas
- 11 said none of these types of lizards

(a) Use a three-set Venn diagram to organize this information.

SEE ATTACHED VENN DIAGRAM.

(b) How many herpetologists were surveyed?

$11 + 3 + 14 + 9 + 8 + 2 + 7 + 12 = \underline{\underline{66}}$

(c) How many of those surveyed named only one kind of lizard?

$3 + 9 + 12 = \underline{\underline{24}}$

(d) How many of those surveyed named exactly two kinds of lizards?

$8 + 14 + 7 = \underline{\underline{29}}$

16. (2 points) Use the number line to model 6-2.

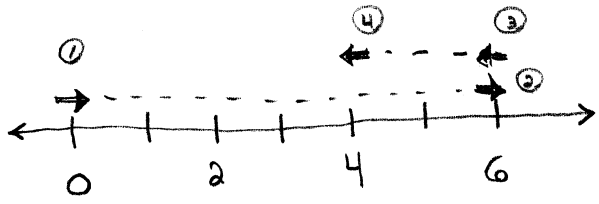
① START AT ZERO FACING RIGHT (+)

② MOVE 6 UNITS FORWARD TO MODEL 6

③ TURN AROUND TO MODEL SUBTRACTION

④ MOVE 2 UNITS FORWARD TO MODEL 2

⑤ END AT 4: 6-2=4



17. (3 points) State two important properties of the Hindu-Arabic numeration system.

1) EVERY NUMERAL IS CONSTRUCTED FROM 10 BASIC DIGITS: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

2) PLACE VALUES ARE POWERS OF TEN: $10^0, 10^1, 10^2, 10^3, \ldots$

18. (3 points) The digits in base sixteen, in order of increasing face value, are:

$$0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F.$$

Write $1D5E_{\text{sixteen}}$ in expanded form and convert to base ten.

$$1 \times 16^3 + 13 \times 16^2 + 5 \times 16^1 + 14 \times 16^0$$

$$= 1 \times 4096 + 13 \times 256 + 5 \times 16 + 14$$

$$= 7518_{\text{TEN}}$$

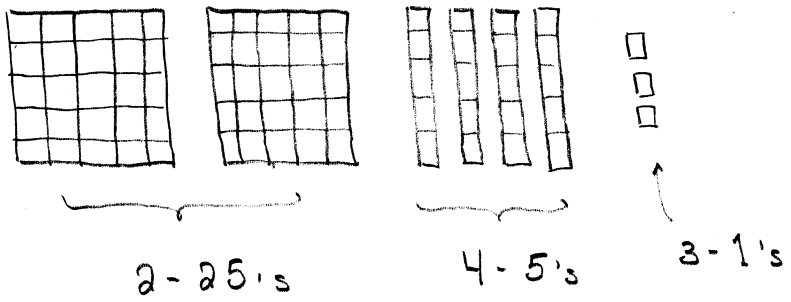
19. (2 points) Use the missing-addend approach to model 7-4.

$7-4=\square \iff 7=\square+4$

SINCE $3+4=7$,

$7-4$ MUST BE 3.

20. (3 points) Use base-five blocks to illustrate 243_{five}. Then use your base-five block representation to convert the numeral to base ten.



$2\times25+4\times5+3$

$=\underline{\underline{73}}$

21. (2 points) Give an example of a set that is closed under the operation of addition. Explain how you know.

$\{0,1,2,3,4,\ldots\}$

THE WHOLE NUMBERS ARE CLOSED UNDER ADDITION BECAUSE THE SUM OF ANY TWO WHOLE NUMBERS IS A WHOLE NUMBER.

22. (2 points) Give an example of a set that is not closed under the operation of addition. Explain how you know.

$\{0,1,2\}$ IS NOT CLOSED UNDER ADDITION.

$1+2=3$ AND 3 IS NOT IN THE SET.

23. (4 points) Let U be the set of lower-case letters of the English alphabet, let $V = \{a, e, i, o, u\}$, and let $A = \{a, b, c\}$.

(a) Determine $A \cup V$.

$\{a, b, c, e, i, o, u\}$

(b) Determine $A - \overline{V}$.

$\{a\}$

(c) Determine $n(\overline{V})$.

$n(\overline{V}) = 21$

(d) List four elements of $A \times V$. (There are 15 elements total.)

(a, a), (a, e), (b, o), (c, i)

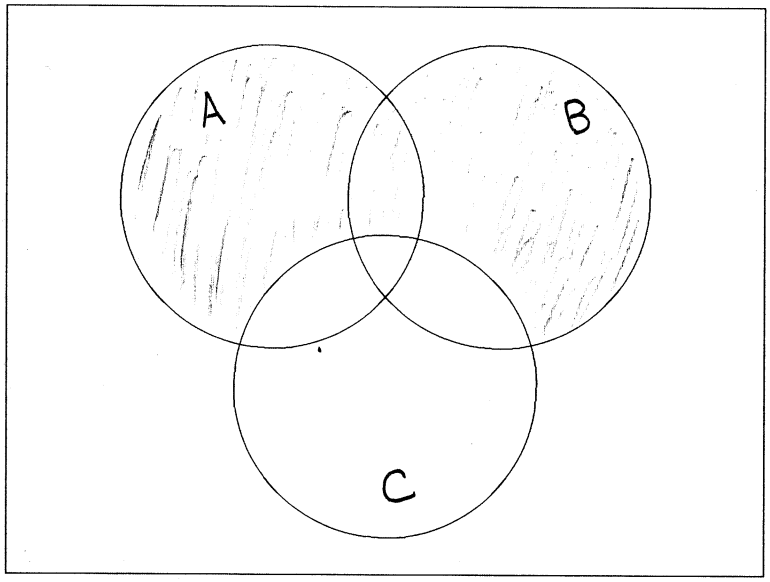
24. (2 points) Rewrite each expression using the indicated property, and only that property, exactly one time.

(a) *Commutative property of addition:* $5 + 3(x + 1)$ $5 + 3(1 + x)$ or $3(x + 1) + 5$

(b) *Associative property of addition:* $(2w + 4) + 9 + (3 + 8x)$

$2w + (4 + 9) + (3 + 8x)$ or $(2w + 4) + (9 + 3) + 8x$

#14 $(A \cup B) \cap \overline{C}$



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