

Math 200 - Test 2
October 20, 2010

Name _____

Score _____

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

1. (1 point) What number comes right after 6566_{seven} ?
 - (a) 6567_{seven}
 - (b) 6570_{seven}
 - (c) 6700_{seven}
 - (d) 6600_{seven}

2. (1 point) Choose the addition model that best fits the following problem situation:
William has toy train cars of assorted shapes and sizes. He connects three cars to form a train that is 9 in long. Then he connects two cars to form a train that is 7 in long. If he connects both trains, what will be the length of the new train?
 - (a) number line model
 - (b) set partition model
 - (c) combination model
 - (d) set model

3. (2 points) Use any algorithm to compute the following sum.
$$333_{\text{four}} + 123_{\text{four}} + 321_{\text{four}} + 323_{\text{four}}$$
 - (a) 1100_{four}
 - (b) 3032_{four}
 - (c) 10203_{four}
 - (d) 2332_{four}

4. (1 point) Suppose A is the set of all PSC students and B is the set of all females. Which one of the following is a description of an element of $\overline{B} - A$?
 - (a) a male who is not a PSC student
 - (b) a female who is not a PSC student
 - (c) a female PSC student
 - (d) a male PSC student

5. (1 point) Choose the multiplication model that best fits the following problem situation:
Mrs. Chesney has 8 packages of 6 markers. How many markers does she have in all?
 - (a) Cartesian product model
 - (b) set partition model
 - (c) area/array model
 - (d) repeated addition model

6. (2 points) Use any of the algorithms we discussed in class, except the standard algorithm, to compute $329 + 287$.

7. (2 points) Use a two-set Venn diagram to help you determine $n(A \cup B)$ if $n(A \cap B) = 3$, $n(A) = 10$, and $n(B) = 12$.

8. (2 points) Convert 473_{eight} to base ten.

9. (3 points) Rewrite each expression using the indicated property, and only that property, exactly one time.

(a) *Commutative property of addition:* $8 \cdot (3 + 1)$

(b) *Commutative property of multiplication:* $2 \cdot (5x + 7)$

(c) *Associative property of addition:* $2y + (2 + 8x) + 4$

10. (5 points) Mr. Strand asked 86 students at his school about the kinds of fruit they normally eat. Here is what he found:

- 43 eat apples
- 36 eat mangos
- 33 eat kiwis
- 13 eat kiwis and mangos
- 15 eat apples and mangos
- 16 eat kiwis and apples
- 8 eat all three

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

(b) How many students do not eat any of these fruits?

(c) How many students eat two of the fruits, but not all three?

(d) How many students eat only one kind of fruit?

11. (3 points) The following number chart can be used to compute sums and differences.

| | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |
| 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 |
| 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 |
| 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 |
| 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 |
| 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 |
| 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 |

(a) To compute $52 - 24$, one could start at 52, then count straight up two rows and back four columns. What subtraction model is being used?

(b) Explain how the missing addend model could be used to compute $32 - 19$.

12. (3 points) Convert 109 to base two.

13. (3 points) Use any **two** of the strategies for mastering basic addition facts to compute $9 + 7$. Show work or explain your reasoning.

14. (1 point) Choose the subtraction model that best fits the following problem situation:
There are 7 chairs in the first row and 4 chairs in the second row. How many more chairs are in the first row?
- (a) take-away model
 - (b) comparison model
 - (c) set partition model
 - (d) missing addend model

15. (1 point) What algorithm is being illustrated here?

$$\begin{array}{r} 72 \\ - 38 \\ \hline \end{array} \longrightarrow \begin{array}{r} 72 + 2 \\ - (38 + 2) \\ \hline \end{array} \longrightarrow \begin{array}{r} 74 \\ - 40 \\ \hline 34 \end{array}$$

- (a) scratch subtraction algorithm
 - (b) fast subtraction algorithm
 - (c) equal-additions algorithm
 - (d) nice-numbers algorithm
16. (1 point) What is the place value of the digit 3 in the numeral 53115_{six} ?
- (a) 6^3
 - (b) $3 \cdot 6^3$
 - (c) 3
 - (d) 1000
17. (1 point) Which one of the following sets is closed under addition?
- (a) $\{0, 1\}$
 - (b) $\{0, 2, 4, 6, 8, \dots\}$
 - (c) $\{1, 3, 9, 27, 81, \dots\}$
 - (d) $\{1, 3, 5, 7, 9, \dots\}$
18. (1 point) Choose the multiplication model that best fits the following problem situation:
John has 7 shirts and 9 ties. How many shirt/tie combinations does he have?
- (a) comparison model
 - (b) repeated addition model
 - (c) area/array model
 - (d) Cartesian product model

19. (3 points) Use a multiplication model to illustrate the following fact.

$$3 \cdot (x + 4) = 3 \cdot x + 3 \cdot 4$$

20. (3 points) Use any of the algorithms we discussed in class, except the standard algorithm, to compute $529 - 287$.

21. (3 points) Use rectangular arrays to model and expand $(2x + 1)(x^2 + 3x + 2)$.

22. (1 point) Explain why 300653_{six} cannot be a correctly written base-six numeral.

23. (2 points) Let $A = \{1, 2, 3\}$ and $B = \{1, 5\}$.

(a) Determine $B \times A$.

(b) Determine $A - B$.

24. (2 points) Use a three-set Venn diagram on the next page (one for each part) to shade the region corresponding to each of these sets. Label your diagrams.

(a) $A \cap \overline{B} \cap \overline{C}$

(b) $(B \cap C) - A$

25. (2 points) Write the first ten counting numbers in base three.