Math 103 Homework 2 answers:

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1. (a) \{m,a,t,h,e,i,c,s\}
   (b) \{x | x is a state in the US, but x is not Alaska or Hawaii\}
   (c) \{x | x is a natural number, and x > 20\}, or \{21,22,23,\ldots\}
   (d) \{Oregon, California, Washington, Hawaii, Alaska\}

2. (a) \(P = \{a,b,c,d\}\)
   (b) \(\{1,2\} \subseteq \{1,2,3,4\}\)
   (c) \(\{0,1\} \subset \{1,2,3,4\}\)
   (d) \(0 \notin \{\}\)
   (e) \(\{0\} \neq \{\}\)

7. (a) 1100 – 100, or 1000
   (b) 501
   (c) 11
   (d) 100
   (e) 3
   (f) 5

8. \(\bar{A}\) is the set of all college students with at least one grade that is not an A, i.e., those college students who do not have a straight A average.

9. (a) 7
   (b) 0

11. (a) \(\notin\)
    (b) \(\notin\)
    (c) \(\notin\)
    (d) \(\notin\)
    (e) \(\in\)
    (f) \(\in\)

13. (a) yes
    (b) no. A may equal B
    (c) yes
    (d) no. Consider A = \{1\} and B = \{1,2\}

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9. (a) \(\bar{B} – A\) or \(B \cap \bar{A}\)
   (b) \(A \cap B\) or \(A \cup B\)
   (c) \((A \cap B) – C\)
   (d) \(A \cap C\)
   (e) \((A \cup B) \cap C\), or \(C – (A \cup B)\)
   (f) \(((B \cup C) \cap A) \cup (A \cap B \cap C)\)

15. (a)
(b) The equation is $A \cap B = \overline{A} \cup \overline{B}$

(c) Let $U = \{a,b,c,d\}$, $A = \{a,b\}$, and $B = \{b,c\}$. Then $A \cup B = \{c,d\}$ \cap $\{a,d\} = \{d\} = \overline{A} \cap \overline{B}$. Also, $A \cup B = \{c,d\} \cup \{a,d\} = \{a,c,d\} = A \cap B$.

18. 18

23. The following Venn diagram indicates that only 490 cardholders are accounted for:
So either there is some other type of credit card the remaining 10 people could have, or else the editor was right.

![Venn Diagram]

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8. (a) 33, 38, 43
   (b) 56, 49, 42

9. (a) 9
   (b) 8
   (c) 3
   (d) 6 or 8
   (e) 5
   (f) 4 or 8
   (g) 9

12. (a)\[
\begin{array}{ccc}
8 & 1 & 6 \\
3 & 5 & 7 \\
4 & 9 & 2 \\
\end{array}
\]

21. (a) $63 - 27 = (63 + 3) - (27 + 3) = 66 - 30 = 36$
   (b) $a - b = (a + c) \neq (b + c)$
   (c) answers vary

25. Answers vary. For example, you can do estimations or mental math to tell if a calculator is correct.

26. (a) When you put 9 and 4 together, it is equal to the same length as 13.
   (b) If you put 9 and 4 together on top of 4 and 9 together, they both equal 13.
   (c) Take the length 9 away from 13 and the length left is equal to 4.
   (d) Take the length 4 away from 13 and the length left is equal to 9.

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6. (a) $(4 + 3) \times 2 = 14$
   (b) no parenthesis needed
   (c) $(5 + 4 + 9) \div 3 = 6$
   (d) no parenthesis needed

2.12
23. (a) 3
   (b) 2
   (c) 2
   (d) 6
   (e) 4
24. 8
28. (a) subtract 18
    (b) divide 54 by 9
    (c) add 11 and 48
    (d) add 8
34. (a) yes
    (b) yes
    (c) yes, a
    (d) yes