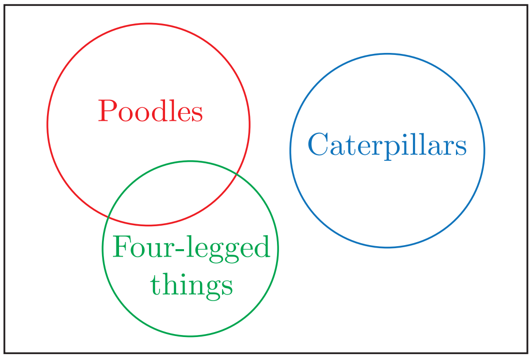
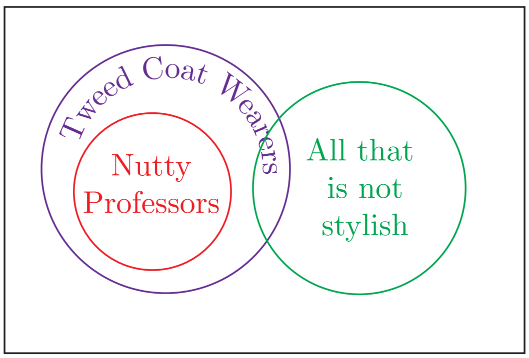
Math 101 Exam #2 Key (Fall 2010)

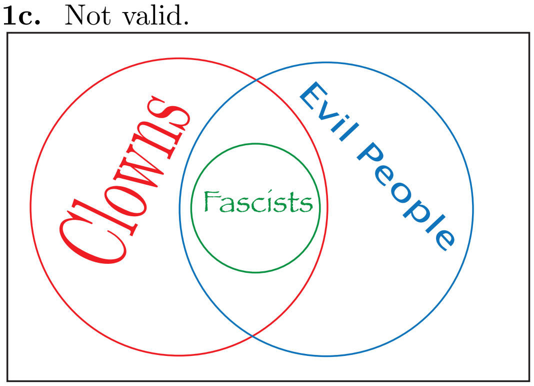
1a. Not valid.



1b. Not valid.



1c. Not valid.



2a. $\{3, 4, 5, 6\}$

2b. $\{2, 4, 6, 8, \ldots\}$

3a. $\{x \mid x \in \mathbb{N} \text{ and } 5 \le x \le 14\}$

3b. $\{x \mid x \in \mathbb{N} \text{ and } x \text{ is odd}\}$

4a. False, since $\{\#\}$ is actually a *subset* of $\{\$, \&, \%, @, \#, =\}$.

4b. True.

4c. False, since $\boxbox$ is actually an *element* of $\{\boxcircle, \square, \boxbox, \boxslash, \boxdot, \boxast\}$.

4d. False, since no set can be a proper subset of itself.

4e. True.

5. $\varnothing$, $\{\ogreaterthan\}$, $\{\sqcup\}$, $\{\times\}$, $\{\ogreaterthan, \sqcup\}$, $\{\ogreaterthan, \times\}$, $\{\sqcup, \times\}$

6a. $(A \cup B)' = \{7\}$

6b. $A' \cup (A \cap B) = \{3, 6, 7\} \cup \{2, 4\} = \{2, 3, 4, 6, 7\}$

6c. $\{1, 2, 4, 5, 8\} - \{1, 5, 7, 8\} = \{2, 4\}$

7. Here $A = \{1, 3, 5, 7, 9\}$, $B = \{2, 4, 6, 8\}$, and $C = \{6, 7, 8, 9\}$, so $(C' \cup A) \cap B = \{1, 3, 5, 6, 7, 8, 9\} \cup \{2, 4, 6, 8\} = \{6, 8\}$

8. $A \times B = \{(q, 4), (q, 6), (q, 8), (r, 4), (r, 6), (r, 8)\}$, $n(A) = 2$, $n(B) = 3$, $n(A \times B) = 6$. (Notice that $n(A) \cdot n(B) = n(A \times B)$, which is not a co-inky-dink.)

9. $\{3, 4, 5, 7\}$

10a. Referring to the regions of a two-set Venn diagram, we find that $(A' \cap B)' = \{\text{I, II, IV}\} = A \cup B'$

10b. Referring to the regions of a three-set Venn diagram, we have $A \cup (B \cap C)' = \{\text{I, II, III, IV, V, VII, VIII}\} \neq \{\text{III, VI, VII}\} = A' \cap (B \cup C)$