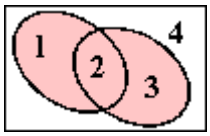
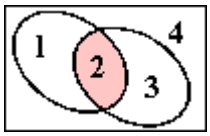
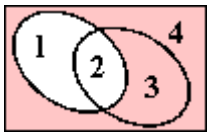
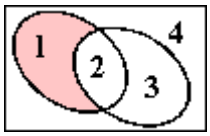
Purplemath

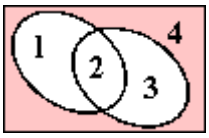
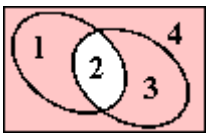
Venn Diagrams & Set Notation *(page 2 of 4)*

Sections: Introduction, Logic and set notation, Set-notation exercises, Venn word problems

The following examples should help you understand the notation, terminology, and concepts related to Venn diagrams and set notation.

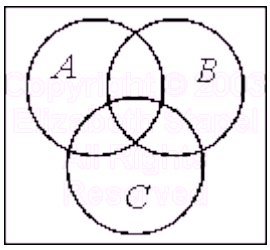
Let's say that our universe contains the numbers 1, 2, 3, and 4. Let A be the set containing the numbers 1 and 2; that is, $A = \{1, 2\}$. (Warning: The curly braces are the customary notation for sets. Do not use parentheses or square brackets.) Let B be the set containing the numbers 2 and 3; that is, $B = \{2, 3\}$. Then we have the following relationships, with pinkish shading marking the solution "regions" in the Venn diagrams:

set notation	pronunciation	meaning	Venn diagram	answer
$A \cup B$	"A union B"	everything that is in either of the sets		$\{1, 2, 3\}$
$A \wedge B$ or $A \cap B$	"A intersect B"	only the things that are in both of the sets		$\{2\}$
A^c or $\sim A$	"A complement", or "not A"	everything in the universe outside of A		$\{3, 4\}$
$A \setminus B$	"A minus B", or "A complement B"	everything in A except for anything in its overlap with B		$\{1\}$

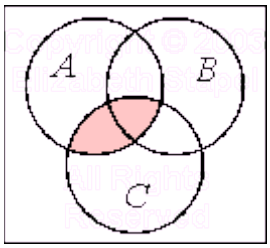
~(A ∪ B)	"not (A union B)"	everything outside A and B		{4}
~(A ∧ B) or ~(A ∩ B)	"not (A intersect B)"	everything outside of the overlap of A and B		{1, 3, 4}

There are gazillions of other possibilities for set combinations and relationships, but these are among the simplest and most common. Note that different texts use different set notation, so you should not be at all surprised if your text uses still other symbols than those used above. But while the notation may differ, the concepts will be the same. By the way, as you probably noticed, your Venn-diagram "circles" don't have to be perfectly round; ellipses will do just fine.

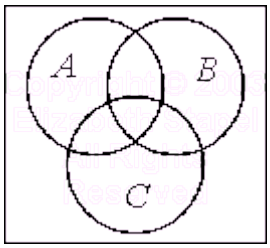
- **Given the following Venn diagram, shade in A ∧ C.**



The intersection of A and C is just the overlap between those two circles, so:

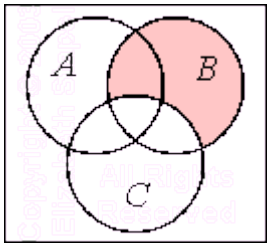


- **Given the following Venn diagram, shade in A U(B □ C).**

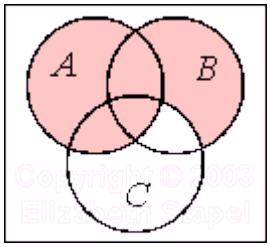


As usual when faced with parentheses, I'll work from the inside out.

I'll first find $B \cap C$. "B complement C" means I take B and then throw out its overlap with C, which gives me this:



Now I have to union this with A:



Note that unioning with A put some of C (that is, some of what I'd cut out when I did "$B \cap C$") back into the answer. This is okay. Just because we threw out C at one point, doesn't mean that it all has to stay out forever.
