Venn diagrams with 3 sets

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Warto w domu spróbować zrobić też zadanie 1.13, gdzie zadanie jest odwrotne - mając rysunek chcemy zapisać zbiór.

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Niektóre przykłady na prezentacji mogą się wydawać skomplikowane. Jeśli tak będzie to najlepiej się nad nimi po prostu głębiej zastanowić.

Example 1

Represent the set $(A \cap B') \cup C$ on a Venn diagram.

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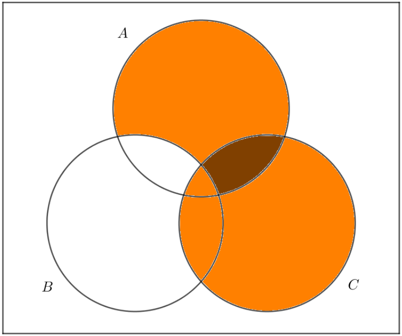
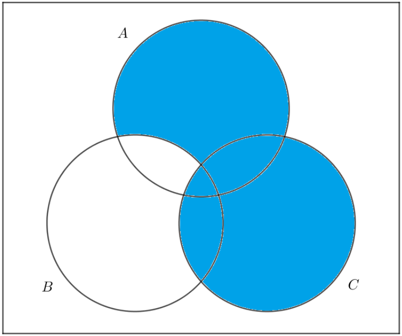
We can start by shading $A \cap B'$ and C. We get the following diagram:



The darker colour means that this region has been shaded twice.

Example 1

Now we want the union ∪ of these two sets, this means that we take everything that has been shaded at least once, so the answer will be:



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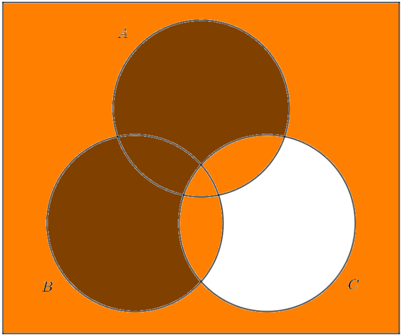
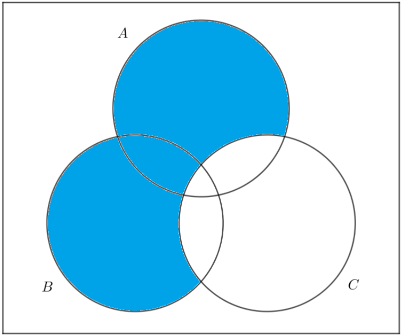


Example 2

Now we want the intersection ∩ of these two sets, so we take everything that has been shaded twice, so the answer will be:



Example 3

Represent the set $B \cap (A \cap C')$ on a Venn diagram.

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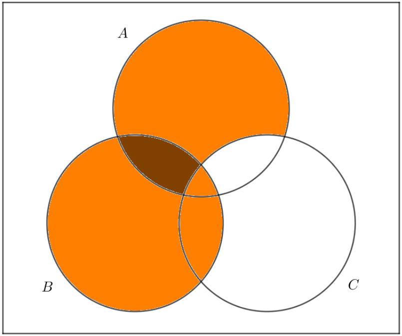
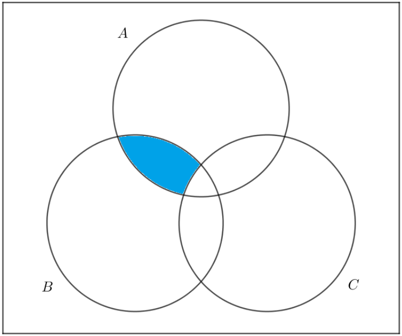
We can start by shading B and $A \cap C'$. We get the following diagram:



Example 3

Now we want the intersection $\cap$ of these two sets, so the answer will be:



Example 4

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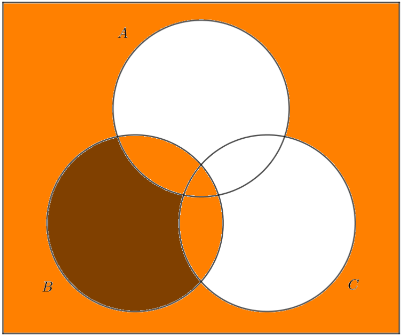
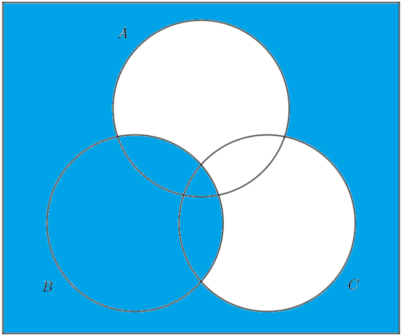
We can start by shading B and $A' \cap C'$. We get the following diagram:



Example 4

Now we want the union ∪ of these two sets, so the answer will be:



Next slides will show a more direct approach.

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Mark on the diagram the set corresponding to $(A \cap B') \cup C$.

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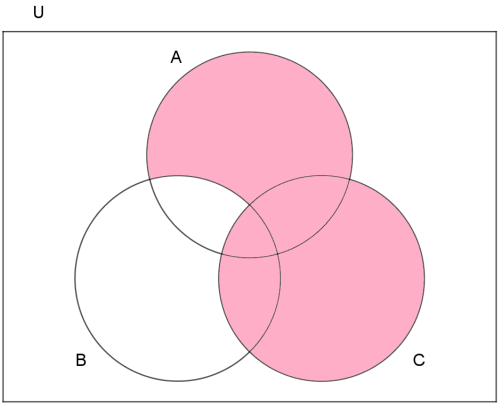
- Finally we have $\cup$ between these, so we want elements that are in at least one of the two sets.

Example 5

Mark on the diagram the set corresponding to $(A \cap B') \cup C$. Answer:



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Let's make some observations:

- $(A \cup B)'$ is everything outside of A and B. We can read this as: *it is not true that it is in A or in B.*
- C' is everything outside of C. So we want elements *not in C*.

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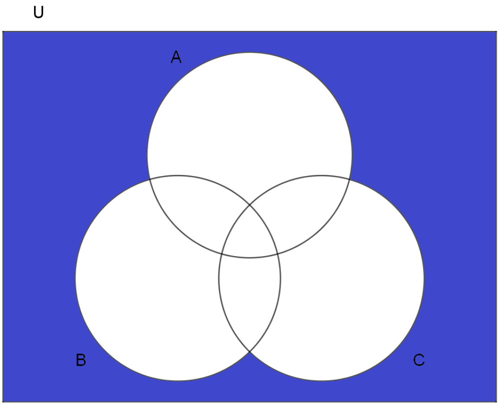
Mark on the diagram the set corresponding to $(A \cup B)' \cap C'$.

Let's make some observations:

- $(A \cup B)'$ is everything outside of A and B. We can read this as: *it is not true that it is in A or in B*.
- C' is everything outside of C. So we want elements *not in C*.
- Finally we have $\cap$ between these, so we want elements that are in both sets. So in the end we want *it is not true that it is in A or in B* ***and*** *it is not in C*.

Example 6

Mark on the diagram the set corresponding to $(A \cup B)' \cap C'$. Answer:



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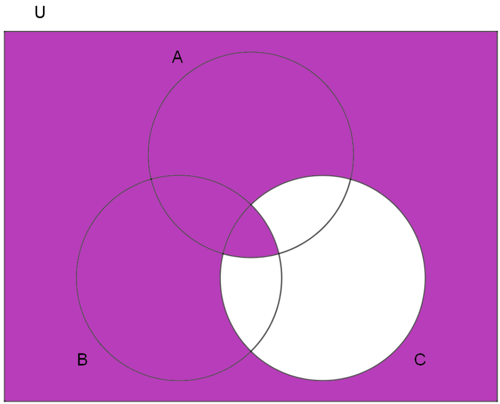
Observations:

- $(A \cap B)$ is everything that is both in A and in B.
- C' is again everything outside of C.
- Finally we have $\cup$ between these, so we want elements that are in at least one of the two sets. We can summarize this as *it is both in A and B* ***or*** *it is not in C*.

Example 7

Mark on the diagram the set corresponding to $(A \cap B) \cup C'$ Answer:



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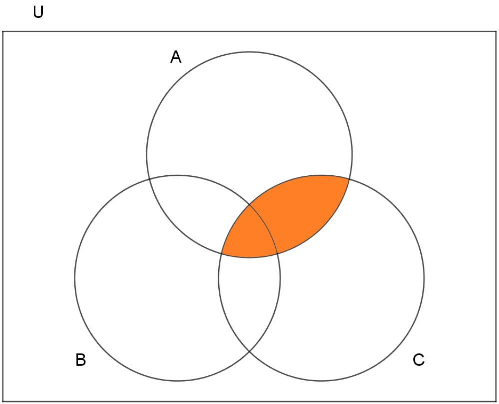
Mark on the diagram the set corresponding to $(A \cup B) \cap (C \cap A)$.

Let's make some observations:

- $(A \cup B)$ is everything in A or in B.
- $(C \cap A)$ is everything in C and in A.
- $(A \cup B) \cap (C \cap A)$ is everything in both of the above so *in A or in B* ***and*** *in C and in A*.

Example 8

Mark on the diagram the set corresponding to $(A \cup B) \cap (C \cap A)$. Answer:



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Mark on the diagram the set corresponding to $(A' \cap B') \cap (B \cup C)$.

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- $(A' \cap B')$ is everything that is both outside of A and outside of B.
- $(B \cup C)$ is everything in B or in C.

Example 9

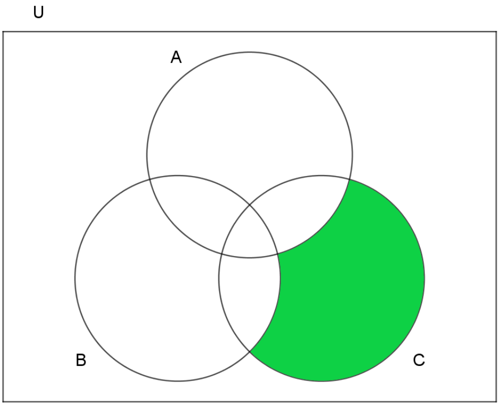
Mark on the diagram the set corresponding to $(A' \cap B') \cap (B \cup C)$.

Let's make some observations:

- $(A' \cap B')$ is everything that is both outside of A and outside of B.
- $(B \cup C)$ is everything in B or in C.
- $(A' \cap B') \cap (B \cup C)$ is everything in both of the above so *not in A and not in B* ***and*** *in B or in C*.

Example 9

Mark on the diagram the set corresponding to $(A' \cap B') \cap (B \cup C)$. Answer:



The short test at the beginning of the class will be similar to one of the examples above.

Przypominam, że jest jeszcze dodatkowa praca domowa dla chętnych (czyli dla wszystkich) - uzasadnić, że liczba podzbiorów zbioru n-elementowego jest równa 2^n.