



Let the universe set $U = \{1, 2, 3, \dots, 10\}$.

Let $A = \{1, 4, 7, 10\}$ $B = \{1, 2, 3, 4, 5\}$
 $C = \{2, 4, 6, 8\}$

List the elements of each set.

$$A \cup B = \{1, 2, 3, 4, 7, 5, 10\}$$

$$B - A = \{2, 3, 5\}$$

$$\bar{U} = \emptyset$$

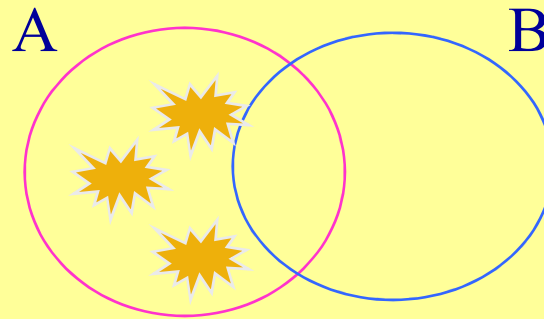
$$A \cup U = U$$

$$\bar{B} \cap (C - A) = \{6, 8\}$$

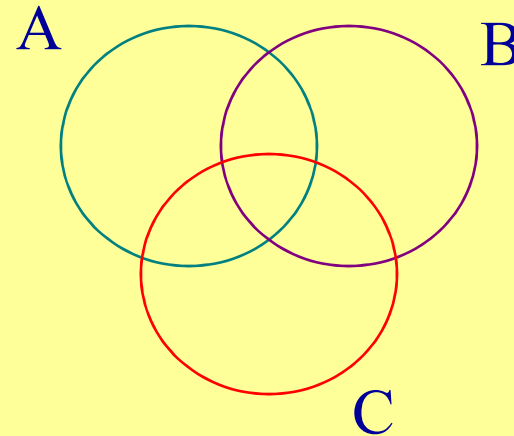
$$(A \cup B) - (C - B) = \{1, 2, 3, 4, 5, 7, 10\}$$

★ Draw a Venn diagram and shade the given set.

$$A \cap \overline{B}$$



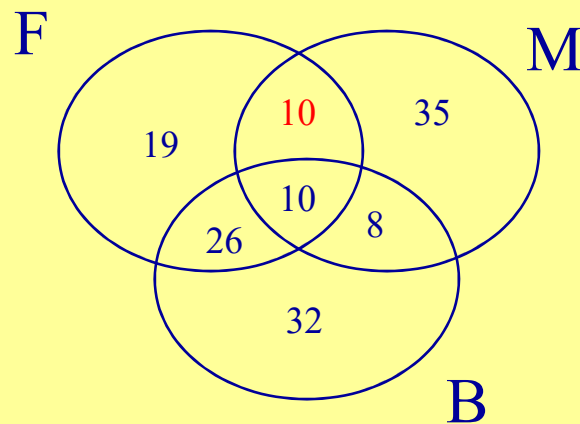
$$((C \cap A) - \overline{(B - A)}) \cap C$$





There is a group of 191 students. 10 students are taking French, Business and Music; 36 are taking French and Business; 20 are taking French and Music; 18 are taking Business and Music; 65 are taking French; 76 are taking Business and 63 are taking Music.

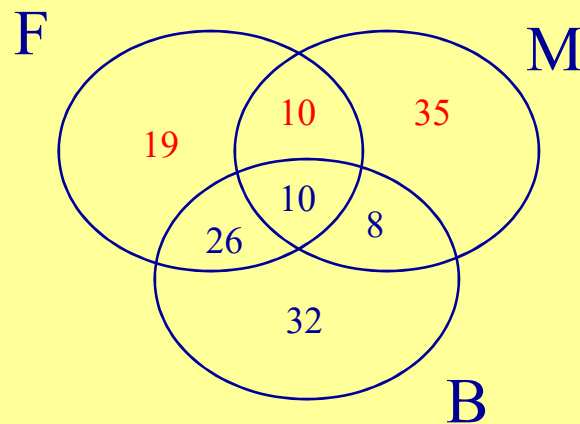
How many are taking French and Music not Business ?





There is a group of 191 students. 10 students are taking French, Business and Music; 36 are taking French and Business; 20 are taking French and Music; 18 are taking Business and Music; 65 are taking French; 76 are taking Business and 63 are taking Music.

How many are taking Music or French (or both) but not Business?





Write "true" if the statement is true; otherwise give a counterexample. The sets X , Y and Z are subsets of a universal set U . Assume that the universe for Cartesian products is $U \times U$.

$$(X \cap Y) \cup (Y - X) = X \text{ for all sets } X \text{ and } Y$$

False

$$X = \{1\} \quad Y = \{1, 2\}$$



For the sequence a defined by

$$a_i = i^2 - 3i + 3 \quad i \geq 1$$

Find $\sum_{i=1}^4 a_i = 12$

Find $\prod_{i=3}^4 a_i = 21$



Using the sequences y and z defined by

$$y_i = 2^i - 1$$

$$z_i = i(i - 1)$$

Find $\left(\sum_{i=1}^3 y_i \right) \left(\sum_{i=1}^3 z_i \right) = 88$

Find $\left(\sum_{i=1}^4 y_i \right) \left(\prod_{i=2}^4 z_i \right) = 3744$



★ Does 9450 represent a number in binary? In octal?

In decimal ? In hexadecimal?

E

E

H

H



1101010 represents in decimal, in hexadecimal.

E



★ For the relation R on the set $\{1,2,3,4,5\}$ defined by the rule
 $(x,y) \in R$ if $x+y \leq 6$

List the elements of R

$R = \{(1,1)(1,3)(1,2)(1,4)(1,5)(2,2)(2,1)(2,3)(2,4)(3,3)(3,2)$
 $(3,1)(4,1)(4,2)(5,1)\}$

Find the range of R

$R = \{1,2,3,4,5\}$

Find the range of R^{-1}

$\text{Dom}(R) = \text{Rng}(R) = \text{Rng}(R^{-1}) = \{1,2,3,4,5\}$



★ Give examples of relations on $\{1,2,3,4\}$ having the properties specified

Reflexive, symmetric and non transitive

$$R = \{(1,1)(2,2)(3,3)(4,4)(1,2)(2,1)(2,3)(3,2)\}$$

Non reflexive, symmetric, not antisymmetric and transitive

$$R = \{(1,1)(1,2)(2,1)(2,2)\}$$



★ Let R and S be relations on X. Determine statement is true or false?

If the statement is false give a counterexample

If R and S are antisymmetric, then $R \cup S$ is antisymmetric

FALSE

$$R = \{(1,2)\} \quad S = \{(2,1)\} \quad R \cup S = \{(1,2), (2,1)\}$$



Determine whether the given relation is an equivalence relation on $\{1,2,3,4,5\}$. Given relation is true or false ?

$\{(1,1)(2,2)(3,3)(4,4)(5,5)(1,5)(5,1)(3,5)(5,3)(1,3)(3,1)\}$

TRUE

$\{(x,y) \mid 3 \text{ divides } x+y\}$

FALSE



Each function is one-to-one. Find each inverse function

$$f(x) = 4x + 2$$

$$f(x)^{-1} = (x-2)/4$$

$$f(x) = 3 + 1/x$$

$$f(x)^{-1} = 1/(x-3)$$