Unit 2 - Relations

Definition :

“ a is related to b by R”

“a is note related to b by R” $\not R$

S

Example:

Properties of Relation

-
-
-
-
-
-
-
-
-

Reflexive Relation

Non Reflexive relation

Irreflexive Relation

Irreflexive Relation….

(reflexive)

(irreflexive)

(irreflexive)

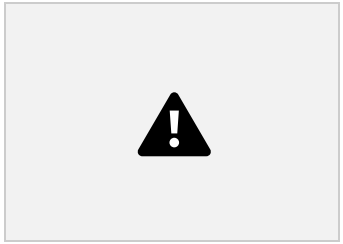
(reflexive)

Symmetric Relation

Asymmetric relation.

(symmetric)

(symmetric)



Asymmetric Relation

Antisymmetric Relation

(3,4),(4,3),

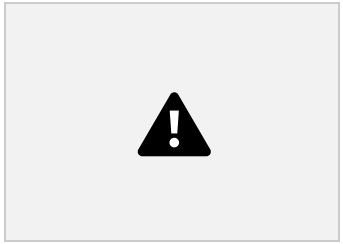
Transitive Relation

Equivalence Relation (RST)

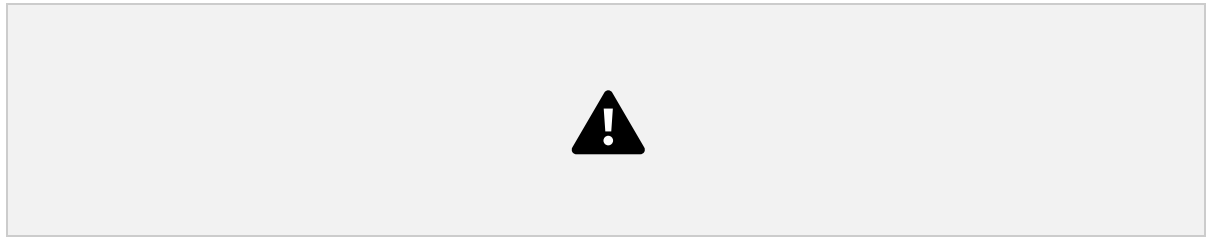
i)

ii)

iii)



Partial Ordered Relations (RAT)



Computer Recognition

REPRESENTATION OF RELATION FOR COMPUTER RECOGNITION

Tools for representation of a relation

1.

2.

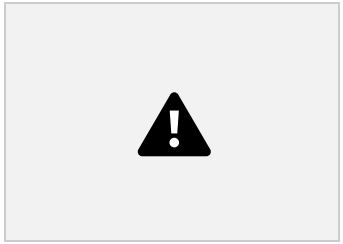
Relation Matrix (Zero-One Matrix) :

Relation Matrix (Zero-One Matrix)….

“Relation matrix”

“ Zero-One Matrix ”

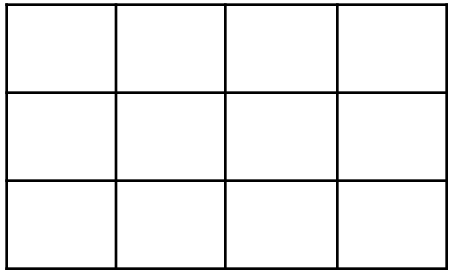
Rows of the matrix corresponds to the elements in set A and columns corresponds to the elements in set B



Relation Matrix (Zero-One Matrix)….

	p	q
0		
1		
2		

M(R)=



Directed Graphs (Digraphs) :

- Vertex Set
- Edge set

Directed Graphs (Digraphs) : Example :

Directed Graphs (Digraphs) :.....

Isolated Vertex

Self-loop

In-degree

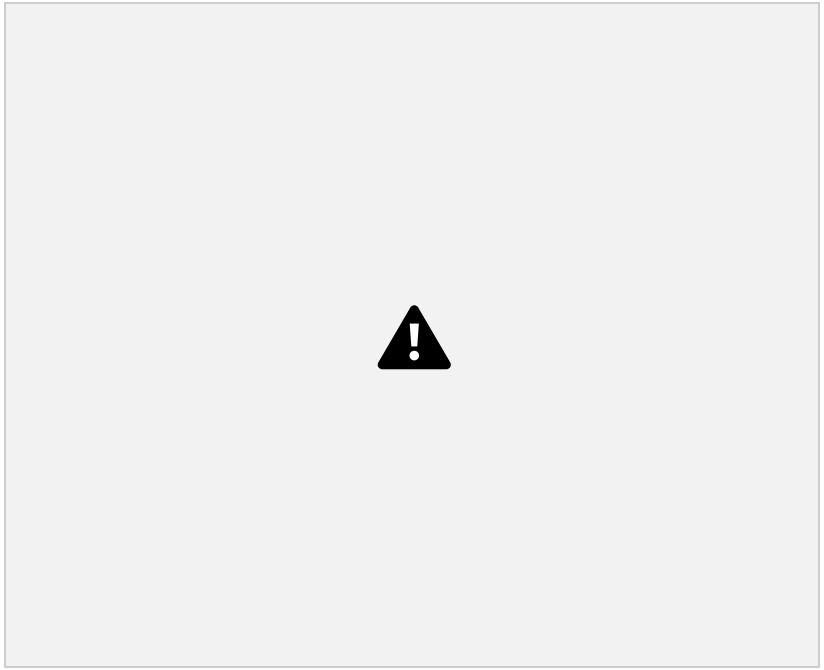
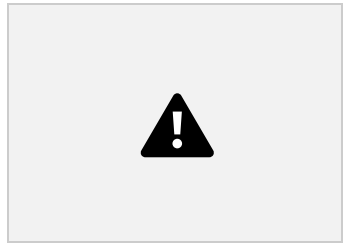
Out degree

Problems :

1.

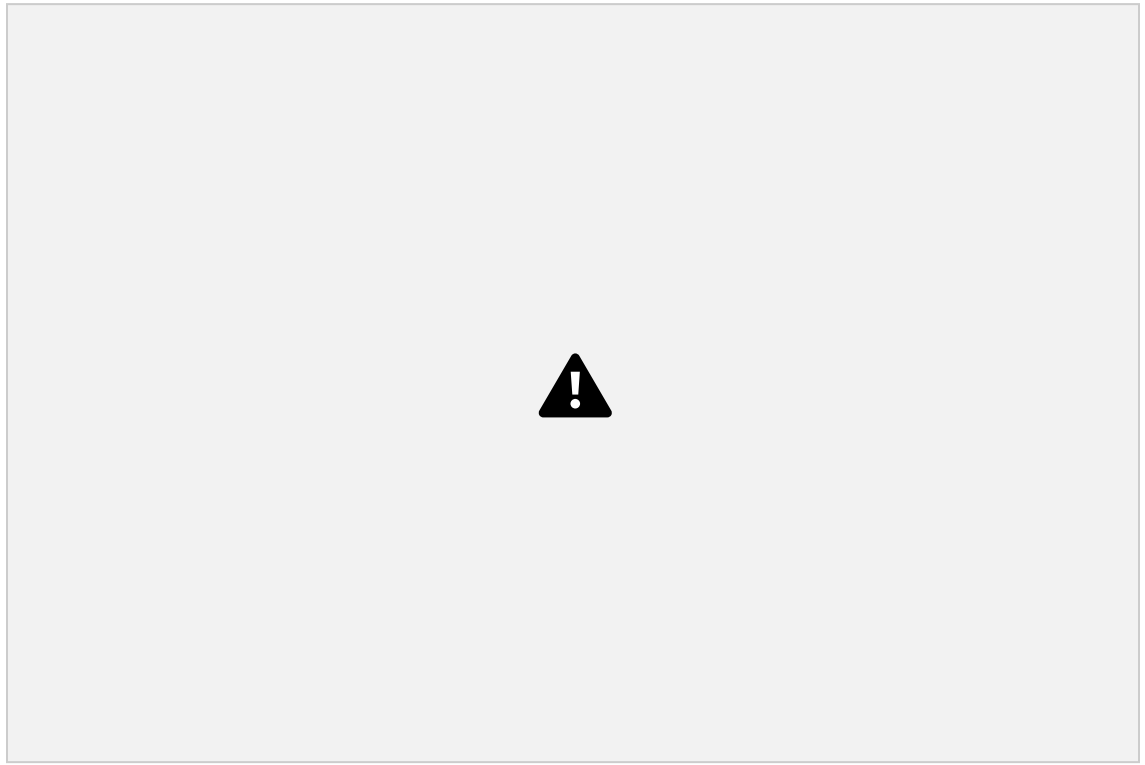
1

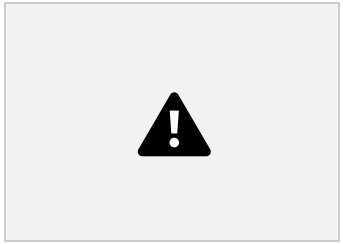
				Out-Degree	4	2	1	1
In-Degree	1	2	3	3				


Problems :. . . .

Problems….

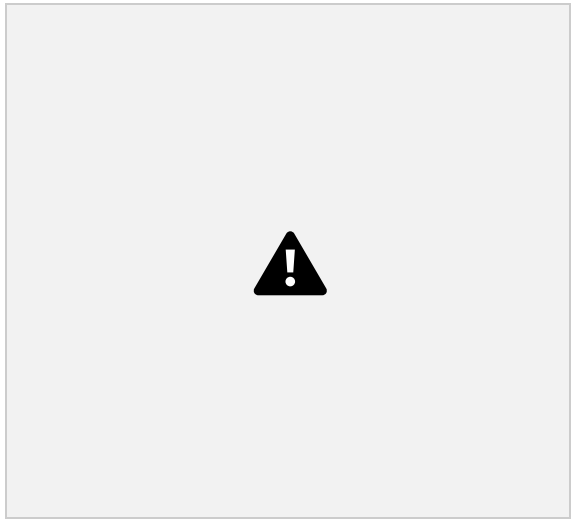




Representation of properties of relation using Zero-One matrix and digraph

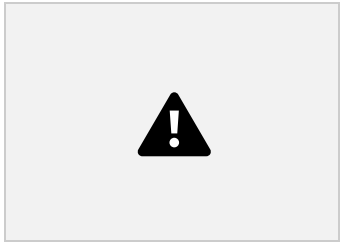
Reflexive Relation :

1		
	1	
		1

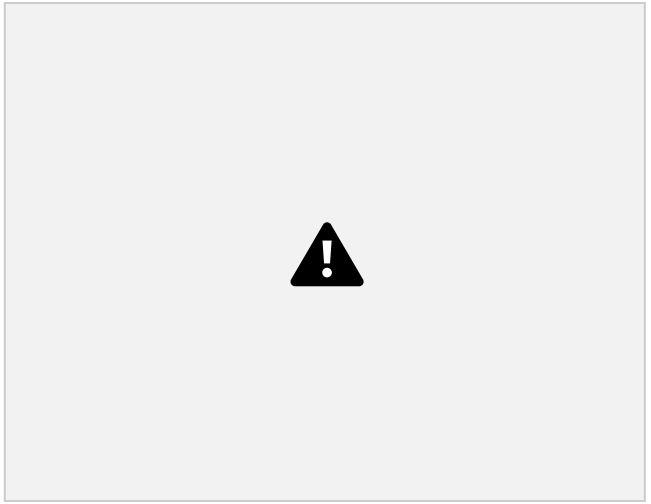


Diagonal elements should be 1 i.e Mij = 1 (i=j)

Each vertex should have self loop



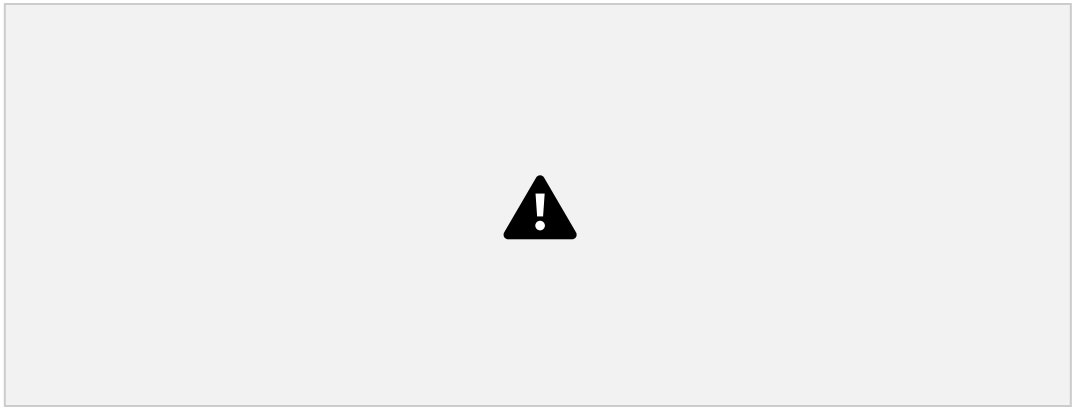
Irreflexive Relation :



None of the diagonal elements should be 1 i.e mij ≠ 1(i=j)

None of the vertex should have self loop

Symmetric Relation:



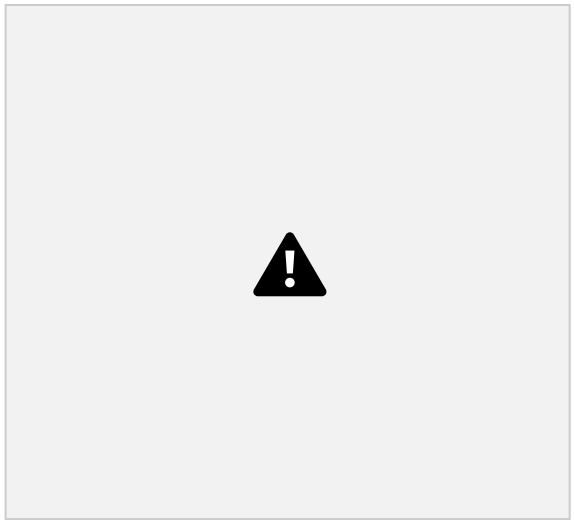
If mij = 1 then mji =1

There should arrows in both the direction

Asymmetric Relation :

If mij = 1 then mij ≠ 1

None of the pair of vertex should have bi-directional arrows

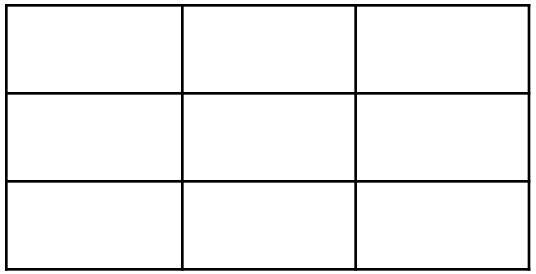


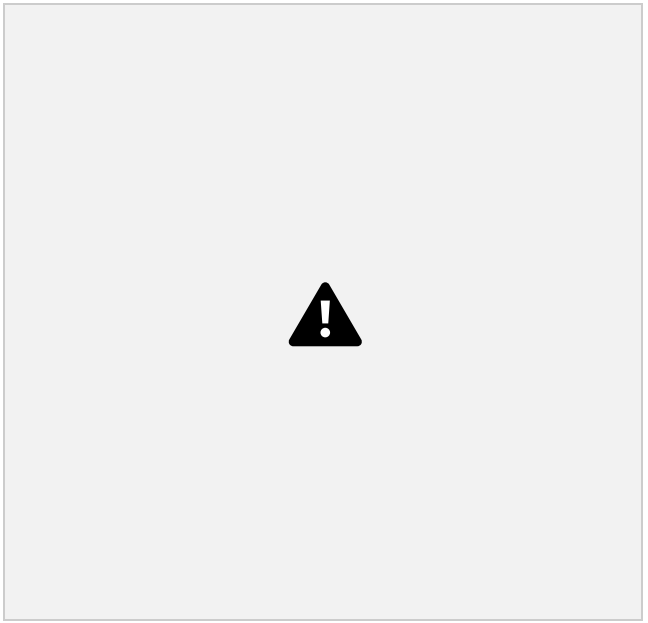
If mij = 1 then mji = 0 but mij = 1.(i=j)

None of the pair of vertex should have bi-directional arrows but any vertex

can have self loop

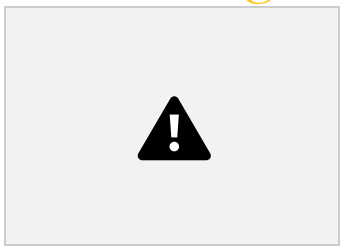
Transitive Relation :



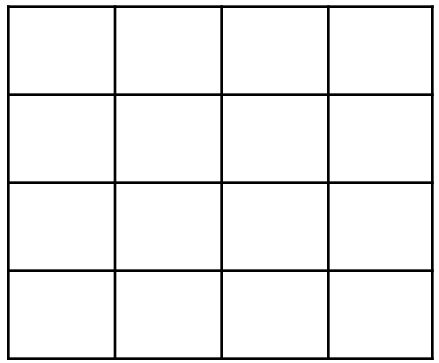


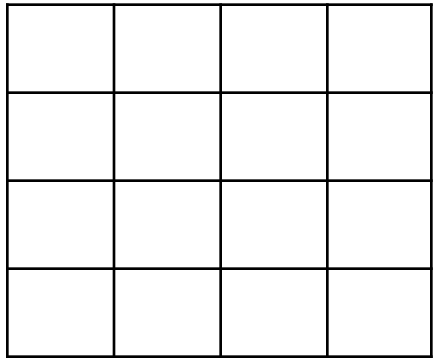
If mik = 1 and mij =1 then mij = 1

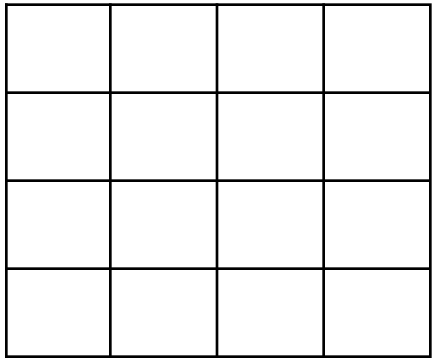
If there is a path of length greater than 1 from vertex a to b, then there is path of length 1 from a to b



Problems :







Operations on Relations :

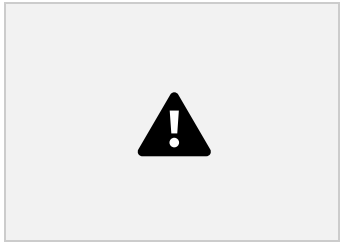
Union of Relations : $(R_1 \cup R_2)$

Intersection of Relations : $(R_1 \cap R_2)$

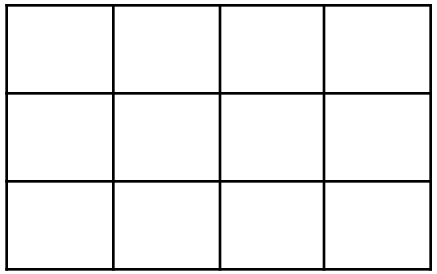
Complement of a Relation: $-R$

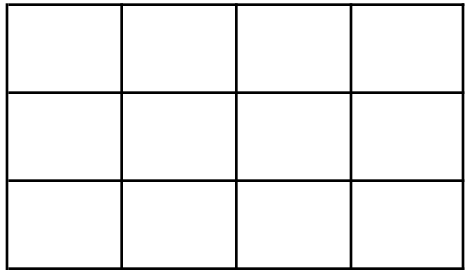
Converse of a Relation : R^c

Problems :

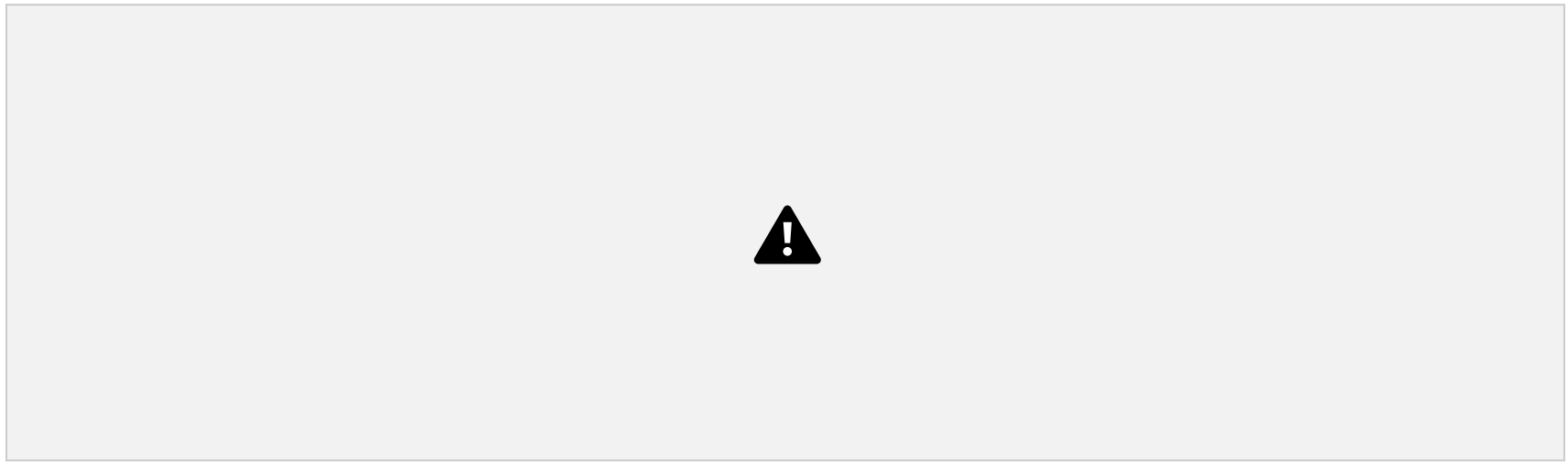


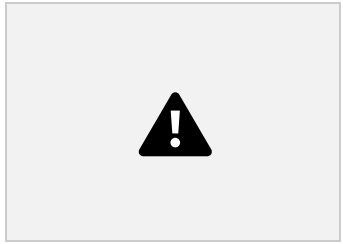
Problem….

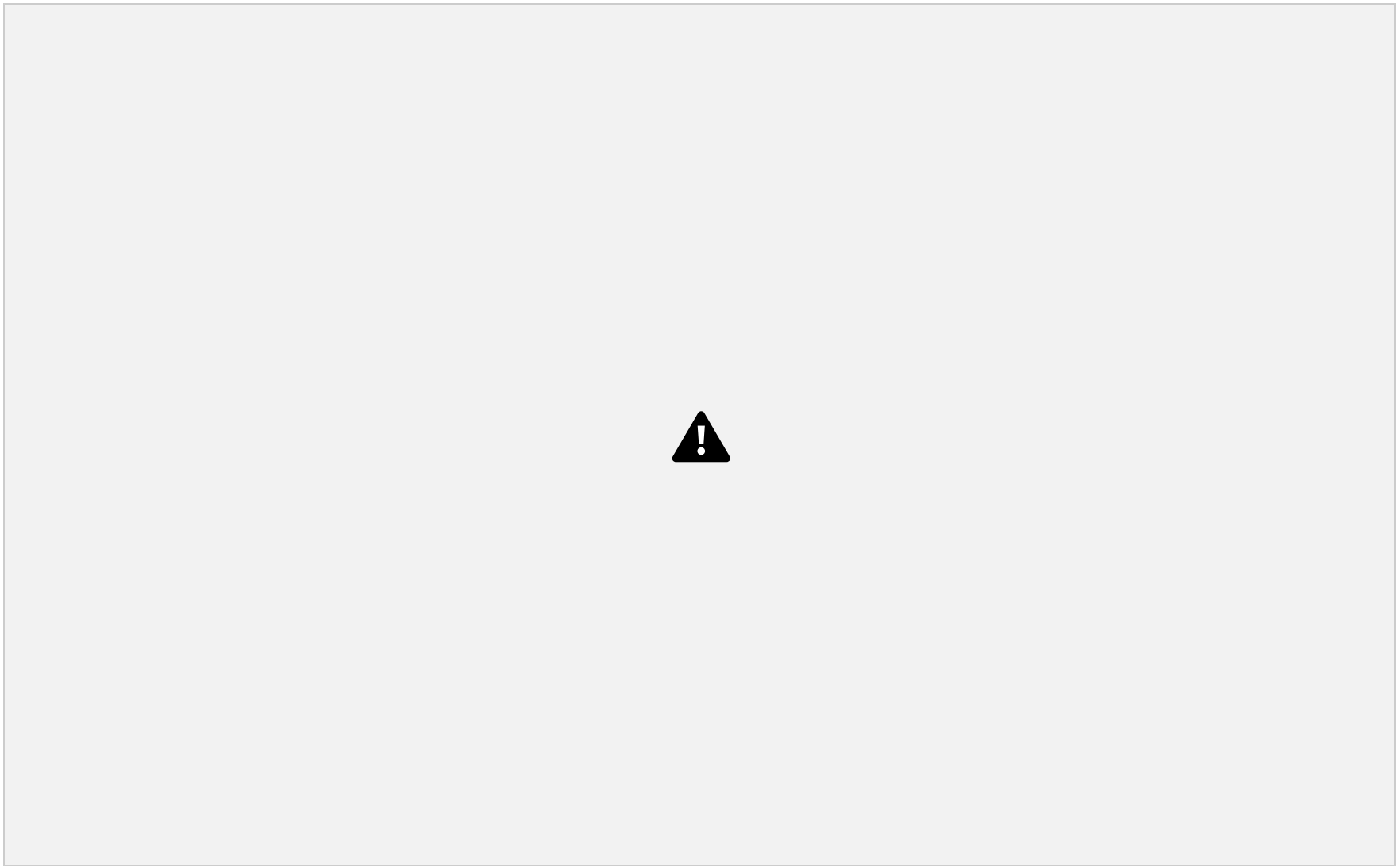




Problems…







Solution

Problems..