REMEMBER:

- The name of the files and sheets must be strictly followed.

Probability of a event

Let A = {birth of a male child}
Pr(A) = (number of favorable cases)/(number of possible cases)
Probability of the event A is:

$$\Pr(A) = \frac{Number\ of\ favorable\ cases}{Number\ of\ possible\ cases},$$

where number of favorable cases is given by those who accomplished the required criterion (e.g. birth of a male child).

Probability of nonA

The probability that something happens is one minus the probability that it does not:
Pr(A) = 1 - Pr(nonA)

Pr(A sau B)=Pr(A∪B)

$\Pr(A \cup B) = \Pr(A) + \Pr(B) - \Pr(A \cap B)$.

Independent events

If two events A and B are independent: $\Pr(A \cap B) = \Pr(A) \cdot \Pr(B)$.

Probabilities applications

1. Prevalence = probability that a subject to have Alzheimer. Use the data from GoldenTest column to answer this question

2. Sensibility (Se = Pr(T|A)) = probability that a test result will be positive when the Alzheimer is present. The following events are used in this formula: T = {Alzheimer test positive} and A = {Alzheimer positive = Golden test positive}

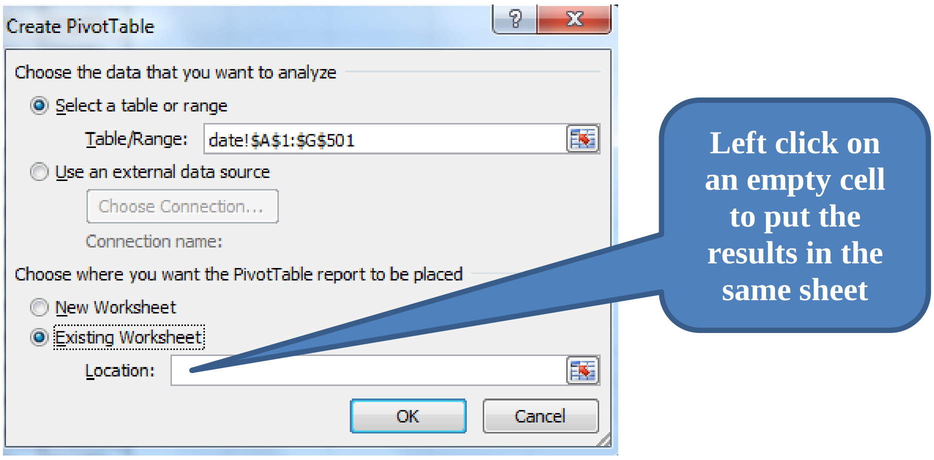
3. Specificity (Sp = Pr(nonT|nonA)) = probability that a test result will be negative when the Alzheimer is not present

4. Positive predictive value (PPV = Pr(A|T)) = probability that the Alzheimer is present when the test is positive.

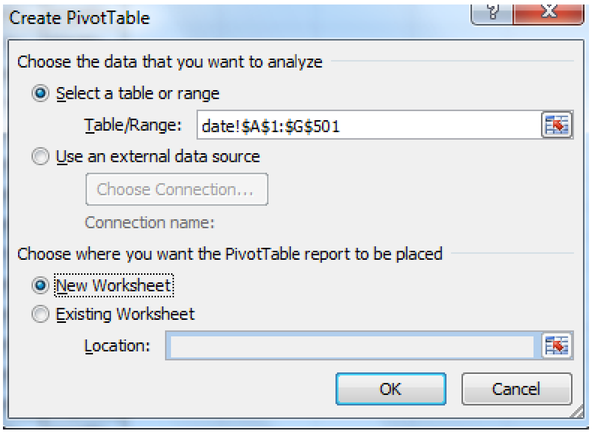
5. Negative predictive value (NPV = Pr(non A|nonT)): probability that the Alzheimer is not present when the test is negative.

Working with contingency tables in Excel

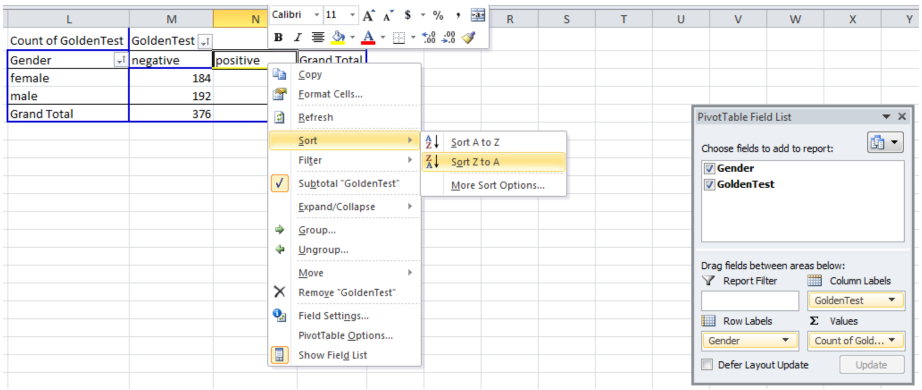
- Select one cell of the table with data (e.g. A2)➔ the whole database it will be selected.
- [Insert-PivotTable]. The next window will appear :



- Validate with OK.

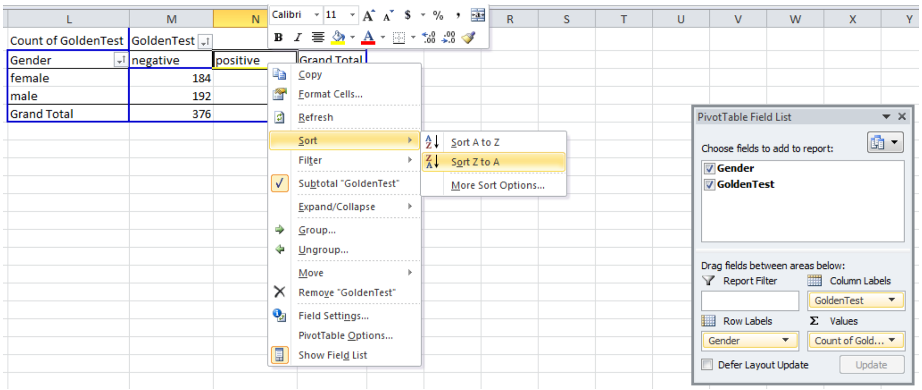


- Using drag-and-drop option place GoldenStandard on Column and Test1 on Row Label. Drag-and-drop again the GoldenTest on **Value**. The resulted selection is similar with the one in the image bellow:



!!! Check if the total is equal with the sample size!!!!

- Use sort option to have in the first column the positive values:



- Copy the contingency table in empty cells and change it to look as the one in the image bellow:

L	M	N	O
	Altzheimer=positive	Altzheimer=negative	Grand Total
Gender=female	99	184	283
Gender=male	25	192	217
Grand Total	124	376	500

- Compute the relative risk for gender using the formula:

$$\mathbf{RR} = \frac{\boldsymbol{a}/(\boldsymbol{a}+\boldsymbol{b})}{\boldsymbol{c}/(\boldsymbol{c}+\boldsymbol{d})}$$

- RR = (99/283)/(25/217)

L	M	N	O
	Altzheimer=positive	Altzheimer=negative	Grand Total
Gender=female	99	184	283
Gender=male	25	192	217
Grand Total	124	376	500
RR	=(M13/O13)/(M14/O14)		

- Interpret the obtained results using the following rules:
  - RR ~ 1 ⟶ association between exposure and disease unlikely to exist.
  - RR >> 1 ⟶ increased risk of disease among those that have been exposed.
  - RR << 1 ⟶ decreased risk of disease among those that have been exposed

L	M	N	O
	Altzheimer=positive	Altzheimer=negative	Grand Total
Gender=female	99	184	283
Gender=male	25	192	217
Grand Total	124	376	500
RR	3	Since RR = 3 ⟶ gender is a risk factor for Alzheimer	