### 1. The Truth of the Matter

**John Venn** (1834-1923) gave us *Venn Diagrams*; a wonderful tool for the graphic representation of sets. His inspiration was due, in part, to his predecessor/contemporary, **George Boole** (1815-1864), who gave us *Boolean Logic*. Let’s see how these two concepts fit together…☺

If we replace the binary numbers, **0** and **1**, with **False** and **True** respectively, or simply **F** and **T**, we can convert the previous Binary representation (below, left) into a Boolean representation (below, right).

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| --- | --- |
| **Binary Representation** | **Boolean Representation** |
|  |  |

Let’s get comfortable with this new interpretation. In the Boolean representation, above right,

a) Q. How is the **FF** region to be interpreted?

A. A student puts his name here if his answer to the question, “*Are you a Grade 5 student?*” is **False** and his answer to the question, “*Do you like Brussels sprouts?*” is also **False**.

b) Q. How is the **TF** region to be interpreted?

A. A student puts his name here if his answer to the question, “*Are you a Grade 5 student?*” is **\_\_\_\_\_\_\_** and his answer to the question, “*Do you like Brussels sprouts?*” is **\_\_\_\_\_\_\_**.

c) Q. How is the **TT** region to be interpreted?

A. A student puts his name here if his answer to the question, “*Are you a Grade 5 student?*” is **\_\_\_\_\_\_\_** and his answer to the question, “*Do you like Brussels sprouts?*” is **\_\_\_\_\_\_\_**.

d) Q. How is the **FT** region to be interpreted?

A. A student puts his name here if his answer to the question, “*Are you a Grade 5 student?*” is **\_\_\_\_\_\_\_** and his answer to the question, “*Do you like Brussels sprouts?*” is **\_\_\_\_\_\_\_**.

### 2. Turning the Tables

Just as the **two** binary numbers 0 and 1, led to **four** pairs, 00, 01, 10, and 11, the **two** Boolean values **F** and **T**, lead to **four** pairs, **FF**, **FT**, **TF**, **TT**.

In our previous worksheet we used the words **OR**, **AND**, and **NOT** to express the relationship between the shaded sets. Let’s look at them again…

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| a) |  | i) Of the four pairs above right (**FF**, **FT**, **TF**, **TT**), how many fall within the shaded relationship, **A OR B? 3**  ii) What do these pairs have in common?  **At least one T !**  iii) Summarize your findings in the **(truth) table** to the right. | |  |  |  |  | | --- | --- | --- | --- | | **OR** | | **B** | | | **F** | **T** | | **A** | **F** | **F** | **T** | | **T** | **T** | **T** | |
| b) |  | i) Of the four pairs (**FF**, **FT**, **TF**, **TT**), how many fall within the relationship, **NOT (A OR B)?**  ii) What do these pairs have in common?    iii) Summarize your findings in the **(truth) table** to the right. | |  |  |  |  | | --- | --- | --- | --- | | **NOR** | | **B** | | | **F** | **T** | | **A** | **F** |  |  | | **T** |  |  | |
| c) |  | i) Of the four pairs (**FF**, **FT**, **TF**, **TT**), how many fall within the relationship, **A AND B?**  ii) What do these pairs have in common?    iii) Summarize your findings in the **(truth) table** to the right. | |  |  |  |  | | --- | --- | --- | --- | | **AND** | | **B** | | | **F** | **T** | | **A** | **F** |  |  | | **T** |  |  | |
| d) |  | i) Of the four pairs (**FF**, **FT**, **TF**, **TT**), how many fall within the relationship, **NOT (A AND B)?**  ii) What do these pairs have in common?    iii) Summarize your findings in the **(truth) table** to the right. | |  |  |  |  | | --- | --- | --- | --- | | \_\_\_\_\_ | | **B** | | | **F** | **T** | | **A** | **F** |  |  | | **T** |  |  | |