### 1. Shady Business with Venn Diagrams…

For each of the following Venn Diagrams complete the **inclusion** sentence using words like **IN, NOT, AND**, **OR**, to describe what qualifies for **set membership** in the shaded area(s).

|  |  |  |
| --- | --- | --- |
| a) |  | For example, an element of the shaded area is…  **IN (true)** the set **A**  Logic Name**: EQU/BUFF/ IN** |
| b) |  | An element of the shaded area is…  **NOT IN** the set **A**  Logic Name**: NOT/NIN** |
| c) |  | An element of the shaded area is…  A **OR** B  Logic Name**: OR** |
| d) |  | An element of the shaded area is…  **NOT (**A **OR** B)  Logic Name**: NOR**  Logic Name**:\_\_\_\_\_\_** |
| e) |  | An element of the shaded area is…  A **AND** B  Logic Name**: AND**  Logic Name**:\_\_\_\_\_\_** |
| f) |  | An element of the shaded area is…  **NOT (** A **AND** B **)**  Logic Name**: NAND** |
| g) |  | An element of the shaded area is…  **EXCLUSIVE OR**  Logic Name**: XOR** |
| h) |  | An element of the shaded area is…  **NOT (EXCLUSIVE OR)**  Logic Name**: XNOR** |

### 2. Representing Venn Diagrams as Binary Numbers…

a) In our last class we let set **U** be the **universe** of all RSGC students. Let set **A** stand for the set of all Grade 5 students and set ­­­­**B** be set of students that like *Brussels sprouts*. A really simple way to create a binary number from a Venn Diagram is to let **1** stand for whether someone is in the set and **0** if they are not in the set. Using this strategy the diagram from Question 2 in our previous worksheet can be coded in Binary shown below.

|  |  |
| --- | --- |
| **Venn Diagram of Two Sets** | **Binary Representation of Venn Diagram** |
|  | |  |  | | --- | --- | | **Base 10** | **A B** | | **0** | **0 0** | | **1** | **0 1** | | **2** | **1 0** | | **3** | **1 1** | |

b) In this next exercise you are asked to extend your understanding of the previous question to include **three** sets.

You might start by filling in the counting sequence of binary numbers in the **second** column of the table below right, before filling in the equivalent base 10 (decimal) number in the **first** column.

Finally, use your understanding of the previous question to place the correct decimal number in the appropriate coloured region in the Venn Diagram.

|  |  |
| --- | --- |
| **Venn Diagram of Three Sets** | **Binary Representation of Venn Diagram** |
|  | |  |  | | --- | --- | | **Base 10** | **A B C** | | **0** | **0 0 0** | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |

**Reference**: <https://github.com/lawrancej/COMP278-2014/blob/master/lectures/lecture3.adoc>