MAT 2440 Spring 2019 Halleck Some fill-in-the-blank exercises for 1.6

**To complete exercise, fill in the blanks in the tables.**

6. Use rules of inference to show that the hypotheses “If it does not rain or if it is not foggy, then the sailing race will be held and the lifesaving demonstration will go on,” “If the sailing race is held, then the trophy will be awarded,” and “The trophy was not awarded” imply the conclusion“It rained.”

Step 1: Provide the statements and then the premises. Also, the conclusion is p.

|  |  |
| --- | --- |
| **letter** | **Statement** |
| p | It rains |
| q | It is foggy |
| r | Sailing race held |
| s | Lifesaving demo held |
| t | Trophy awarded |

|  |  |
| --- | --- |
| **Premise in words** | **Premise in symbols** |
| If it does not rain or if it is not foggy, then the sailing race will be held and the lifesaving demonstration will go on |  |
| If the sailing race is held, then the trophy will be awarded, |  |
| The trophy was not awarded |  |

Step 2: To provide formal treatment, provide numbered list of statements & reasons.

|  |  |  |
| --- | --- | --- |
| **#** | **Statement** | **Reason** |
| **1** |  | premise |
| 2 |  |  |
| **3** |  |  |
| 4 |  |  |
| **5** |  | DeMorgan’s Law (applied to 4) |
| 6 |  |  |
| **7** |  | Modus tollens (applied to 5&6) |
| 8 |  |  |
| 9 |  | Double negation law (applied to first part of 8) |
| 10 |  |  |

35. Determine whether this argument, taken from Kalish and Montague [KaMo64], is valid.

If Superman were able and willing to prevent evil, he would do so. If Superman were unable to prevent evil, he would be impotent; if he were unwilling to prevent evil, he would be malevolent. Superman does not prevent evil. If Superman exists, he is neither impotent nor malevolent. Therefore, Superman does not exist.

|  |  |
| --- | --- |
| **Premise in words** | **Premise in symbols** |
| If Superman were able and willing to prevent evil, he would do so. |  |
| If Superman were unable to prevent evil, he would be impotent. |  |
| if he were unwilling to prevent evil, he would be malevolent |  |
| Superman does not prevent evil. |  |
| If Superman exists, he is neither impotent nor malevolent. |  |

Step 1: Provide the statements and then the premises. Also, the conclusion is .

|  |  |
| --- | --- |
| **letter** | **Statement** |
| p | Able to prevent evil |
| q | Willing to prevent evil |
| r | Does prevent evil |
| s | Is powerful |
| t | Is good |
| u | Exists |

Step 2: To provide formal treatment, provide numbered list of statements & reasons.

|  |  |  |
| --- | --- | --- |
| **#** | **Statement** | **Reason** |
| **1** |  | premise |
| 2 |  |  |
| **3** |  |  |
| 4 |  | DeMorgan’s Law (applied to 3) |
| **5** |  |  |
| 6 |  | Table 7 p. 28 applied to 5 |
| **7** |  |  |
| 8 |  | \_\_\_\_\_\_\_\_\_\_\_\_ applied to 4 and 7 |
| 9 |  |  |
| 10 |  |  |
| 11 |  |  |
| 12 |  | \_\_\_\_\_\_\_\_\_\_\_\_ applied to 8 and 11 |
| 13 |  | Commutativity of *or* (applied to 12) |
| 14 |  | DeMorgan’s Law (applied to 13) |
| 15 |  |  |
| 16 |  |  |
| 17 |  | Double negation law (applied to 2nd part of the last part of 16) |
| 18 |  |  |