



**Tema:** Demostraciones- Sustitución de equivalencias

**Nombre:** \_\_\_\_\_

**Fecha:** \_\_\_\_\_

Recuerde las equivalencias que puede utilizar son:

|                   |                                                                                    |                   |                                                                 |
|-------------------|------------------------------------------------------------------------------------|-------------------|-----------------------------------------------------------------|
| E <sub>1</sub> :  | $(p \uparrow q) \equiv \sim(p \wedge q)$                                           | E <sub>2</sub> :  | $(p \nwarrow q) \equiv \sim(p \rightarrow q)$                   |
| E <sub>3</sub> :  | $(p \nearrow q) \equiv \sim(p \leftarrow q)$                                       | E <sub>4</sub> :  | $(p \downarrow q) \equiv \sim(p \vee q)$                        |
| E <sub>5</sub> :  | $(p \underline{\vee} q) \equiv \sim(p \leftrightarrow q)$                          | E <sub>6</sub> :  | $(p \leftarrow q) \Leftrightarrow p \vee (p \leftrightarrow q)$ |
| E <sub>7</sub> :  | $(p \leftrightarrow q) \Leftrightarrow (p \rightarrow q) \wedge (q \rightarrow p)$ | E <sub>8</sub> :  | $(p \rightarrow q) \Leftrightarrow \sim p \vee q$               |
| E <sub>9</sub> :  | $\sim(\sim p \vee \sim q) \Leftrightarrow (p \wedge q)$                            | E <sub>10</sub> : | $\sim(\sim p \wedge \sim q) \Leftrightarrow (p \vee q)$         |
| E <sub>11</sub> : | $\sim p \Leftrightarrow p \uparrow p$                                              | E <sub>12</sub> : | $\sim p \Leftrightarrow p \downarrow p$                         |
| E <sub>13</sub> : | $p \vee (p \wedge q) \equiv p$                                                     | E <sub>14</sub> : | $p \wedge (p \vee q) \equiv p$                                  |
| E <sub>15</sub> : | $\sim p \rightarrow q \equiv \sim q \rightarrow p$                                 | E <sub>16</sub> : | $p \rightarrow \sim q \equiv q \rightarrow \sim p$              |
| E <sub>17</sub> : | $p \rightarrow q \equiv \sim q \rightarrow \sim p$                                 | E <sub>18</sub> : | $q \rightarrow p \equiv \sim p \rightarrow \sim q$              |
| E <sub>19</sub> : | $p \rightarrow q \equiv q \leftarrow p$                                            |                   |                                                                 |

Seleccione la ley que se ha aplicado para su respectiva demostración:

1) Demosstrar  $(p \wedge r) \vee \sim p \equiv p \rightarrow r$

| Proposiciones |                                                                          | Razones |
|---------------|--------------------------------------------------------------------------|---------|
| 1             | $(p \wedge r) \vee \sim p \equiv (p \wedge r) \vee \sim p$               |         |
| 2             | $(p \wedge r) \vee \sim p \equiv \sim p \vee (p \wedge r)$               |         |
| 3             | $(p \wedge r) \vee \sim p \equiv (\sim p \vee p) \wedge (\sim p \vee r)$ |         |
| 4             | $(p \wedge r) \vee \sim p \equiv \sim p \wedge (\sim p \vee r)$          |         |
| 5             | $(p \wedge r) \vee \sim p \equiv (\sim p \vee r)$                        |         |
| 6             | $(p \wedge r) \vee \sim p \equiv p \rightarrow r$                        |         |

2) Demosstrar  $[(p \wedge q) \vee \sim p] \equiv \sim(p \wedge r)$

| Proposiciones |                                                            | Razones |
|---------------|------------------------------------------------------------|---------|
| 1             | $(p \wedge q) \vee \sim p \equiv (p \wedge q) \vee \sim p$ |         |
| 2             | $(p \wedge q) \vee \sim p \equiv \sim p \vee (p \wedge q)$ |         |



|   |                                                                          |
|---|--------------------------------------------------------------------------|
| 3 | $(p \wedge q) \vee \sim p \equiv (\sim p \vee p) \wedge (\sim p \vee q)$ |
| 4 | $(p \wedge q) \vee \sim p \equiv \sim p \wedge (\sim p \vee q)$          |
| 5 | $(p \wedge q) \vee \sim p \equiv (\sim p \vee q)$                        |
| 6 | $(p \wedge q) \vee \sim p \equiv p \rightarrow q$                        |
| 7 | $(p \wedge q) \vee \sim p \equiv (p \wedge r)$                           |

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Ubique en el orden correcto los siguientes pasos para la demostración señalada.

3) **Demosstrar**  $\sim [\sim p \rightarrow \sim q] \equiv q \wedge \sim p$

|                                                                       |                                                                            |                                                                  |
|-----------------------------------------------------------------------|----------------------------------------------------------------------------|------------------------------------------------------------------|
| $\sim [\sim p \rightarrow \sim q] \equiv \sim [\sim q \vee p]$        | $\sim [\sim p \rightarrow \sim q] \equiv q \wedge \sim p$                  | $\sim [\sim p \rightarrow \sim q] \equiv \sim [q \rightarrow p]$ |
| $\sim [\sim p \rightarrow \sim q] \equiv \sim [\sim q] \wedge \sim p$ | $\sim [\sim p \rightarrow \sim q] \equiv \sim [\sim p \rightarrow \sim q]$ |                                                                  |

| Proposiciones |  |
|---------------|--|
| 1             |  |
| 2             |  |
| 3             |  |
| 4             |  |
| 5             |  |

| Razones        |
|----------------|
| Axi. Reflexivo |
| E18            |
| E8             |
| Morgan         |
| Complemento    |

4) **Demosstrar**  $\sim [(p \vee q) \wedge \sim p] \equiv \sim p \rightarrow \sim q$

|                                                                          |   |                                                                                          |   |
|--------------------------------------------------------------------------|---|------------------------------------------------------------------------------------------|---|
| $\sim [(p \vee q) \wedge \sim p] \equiv q \rightarrow p$                 | A | $\sim [(p \vee q) \wedge \sim p] \equiv \sim [\sim p \wedge q]$                          | F |
| $\sim [(p \vee q) \wedge \sim p] \equiv \sim [\sim p] \vee \sim q$       | B | $\sim [(p \vee q) \wedge \sim p] \equiv \sim [\sim p \wedge (p \vee q)]$                 | G |
| $\sim [(p \vee q) \wedge \sim p] \equiv \sim [F \vee (\sim p \wedge q)]$ | C | $\sim [(p \vee q) \wedge \sim p] \equiv p \vee \sim q$                                   | H |
| $\sim [(p \vee q) \wedge \sim p] \equiv q \vee p$                        | D | $\sim [(p \vee q) \wedge \sim p] \equiv \sim p \rightarrow \sim q$                       | I |
| $\sim [(p \vee q) \wedge \sim p] \equiv \sim [(p \vee q) \wedge \sim p]$ | E | $\sim [(p \vee q) \wedge \sim p] \equiv \sim [(\sim p \wedge p) \vee (\sim p \wedge q)]$ | J |



| <i>Proposiciones</i> |  |
|----------------------|--|
| 1                    |  |
| 2                    |  |
| 3                    |  |
| 4                    |  |
| 5                    |  |
| 6                    |  |
| 7                    |  |
| 8                    |  |
| 9                    |  |
| 10                   |  |

| <i>Razones</i>        |
|-----------------------|
| <i>Axi. Reflexivo</i> |
| <i>Conmutativo</i>    |
| <i>Distributivo</i>   |
| <i>Complemento</i>    |
| <i>Identidad</i>      |
| <i>Morgan</i>         |
| <i>Complemento</i>    |
| <i>Conmutativa</i>    |
| <i>E8</i>             |
| <i>E18</i>            |

*Realizar las siguientes demostraciones en su cuaderno y subirlo al CLASSROOM*

5) *Demosatrar*  $\sim [(q \vee r) \wedge q] \equiv q \downarrow q$