**TRABAJO PRÁCTICO N°1: LÓGICA PROPOSICIONAL**

1. Sin usar tabla de verdad pruebe y/o simplifique según corresponda (**indique en cada paso las leyes del álgebra proposicional que emplea**):

|  |  |
| --- | --- |
| 1.a | Asociativa  Idempotencia  Distributiva  Conmutativa y Asociativa  Complemento e Idempotencia  Identidad  Identidad |
| 1.b | Ley de Morgan  Doble negación  Conmutativa  Distributiva inversa  Complemento  Identidad |
| 1.c | Asociativa  Distributiva  Complemento  Identidad |
| 1.d | Ley de Morgan  Ley de Morgan y Doble negación  Doble negación  Asociativa  Absorcion y Conmutativa  Idempotencia |
| 1.e | Ley de Morgan y Ley de Absorcion  Doble Negacion  Absorcion  Complemento  Identidad |
| 1.f | Absorcion  Asociativa  Distributiva  Complemento y Asociativa  Identidad  -> No se comprueba la equivalencia |
| 1.g | Distributiva |
| 1.h | Ley de condicional / Implicacion material  Ley de condicional / Implicacion material  Distributiva  Morgan |
| 1.i | Ley de condicional / Implicacion material |
| 1.j | Ley de condicional / Implicacion material  Distributiva  Morgan  Conmutativa  Complemento  Identidad  Complemento  T |

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2- Demuestre las equivalencias siguiente comprobando las equivalencias duales ***(indique en cada paso las leyes del álgebra proposicional que emplea***):

|  |  |
| --- | --- |
| 2.a |  |
| 2.b |  |
| 2.c |  |
| 2.d |  |
| 2.e |  |
| 2.f |  |
| 2.g |  |

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***Ejercicios complementarios y de repaso***

4. Construya la tabla de verdad de cada una de las siguientes proposiciones

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4.a | |  |  |  |  |  | | --- | --- | --- | --- | --- | | p | q |  |  |  | | V | V | V | V | V | | V | F | V | F | F | | F | V | V | F | F | | F | F | F | F | V |   V es DISJUNCION (O/OR) con que una sea V => es V. Solo es F si ambas son F  es CONJUNCION (Y/AND) solo es V si ambas son V  es IMPLICACION solo es F si: V F |
| 4.b | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | q | p |  |  |  |  | | V | V | F | F | V | F | | V | F | V | V | F | F | | F | V | F | V | F | F | | F | F | V | V | V | V |   es IMPLICACION solo es F si: V -> F  es DOBLE IMPLICACION solo es V si ambas coinciden en su valor  es DOBLE IMPLICACION solo es V si ambas coinciden en su valor |
| 4.c | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | p | q |  |  |  |  |  | | V | V | F | F | V | V | V | | V | F | F | V | F | F | V | | F | V | V | F | F | F | V | | F | F | V | V | V | V | V |   es DOBLE IMPLICACION solo es V si ambas coinciden en su valor  es DOBLE IMPLICACION solo es V si ambas coinciden en su valor  es DOBLE IMPLICACION solo es V si ambas coinciden en su valor |
| 4.d | |  |  |  |  |  | | --- | --- | --- | --- | --- | | p | q |  |  |  | | V | V | V | V | V | | V | F | F | V | V | | F | V | V | F | F | | F | F | V | V | V |     Las 3 son : IMPLICACION solo es F si: V -> F |
| 4.e | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | p | q |  |  |  |  |  |  |  | | V | V | F | F | V | V | F | V | V | | V | F | F | V | F | F | F | F | V | | F | V | V | F | F | F | F | F | V | | F | F | V | V | V | F | V | V | V |   es DOBLE IMPLICACION solo es V si ambas coinciden en su valor  es CONJUNCION (Y/AND) solo es V si ambas son V  es CONJUNCION (Y/AND) solo es V si ambas son V  V es DISJUNCION (O) con que una sea V => es V. Solo es F si ambas son F  es DOBLE IMPLICACION solo es V si ambas coinciden en su valor |
| 4.f | |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | p | q | r |  |  |  |  |  |  |  | | V | V | V | V | V | F | V | V | V | F | | V | V | F | F | V | F | V | F | F | V | | V | F | V | V | V | F | V | V | V | F | | V | F | F | F | V | F | V | F | F | V | | F | V | V | V | V | F | V | V | V | F | | F | V | F | F | F | V | V | V | V | V | | F | F | V | F | F | V | F | V | F | F | | F | F | F | F | F | V | F | V | F | F |   CONJUNCION (Y) Solo es V si ambas son V  DISYUNCION (O)  NEGACION |
| 4.g | |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | p | q | r |  |  |  |  |  | | V | V | V | F | F | V | V | V | | V | V | F | F | F | V | F | F | | V | F | V | F | V | F | F | V | | V | F | F | F | V | F | V | F | | F | V | V | V | F | F | V | F | | F | V | F | V | F | F | F | V | | F | F | V | V | V | V | F | F | | F | F | F | V | V | V | V | V |   es DOBLE IMPLICACION solo es V si ambas coinciden en su valor  es DOBLE IMPLICACION solo es V si ambas coinciden en su valor  es DOBLE IMPLICACION solo es V si ambas coinciden en su valor |
| 4.h | |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | p | q | r | s |  |  |  |  |  |  | | V | V | V | V | F | V | V | V | V | V | | V | V | V | F | F | F | F | V | F | F | | V | V | F | V | V | V | V | V | V | V | | V | V | F | F | V | F | F | V | F | F | | V | F | V | V | F | V | V | V | V | F | | V | F | V | F | F | V | V | V | V | F | | V | F | F | V | V | V | V | V | V | F | | V | F | F | F | V | V | V | V | V | F | | F | V | V | V | F | V | V | F | F | F | | F | V | V | F | F | F | V | F | F | F | | F | V | F | V | V | V | V | V | V | V | | F | V | F | F | V | F | V | V | V | V | | F | F | V | V | F | V | V | F | F | F | | F | F | V | F | F | V | V | F | F | F | | F | F | F | V | V | V | V | V | V | F | | F | F | F | F | V | V | V | V | V | F |   IMPLICACION solo es F si: V -> F  IMPLICACION solo es F si: V -> F  V es DISYUNCION (O) con que una sea V => es V. Solo es F si ambas son F |
| 4.i | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | q | r | p |  |  |  | | V | V | V | F | V | V | | V | V | F | F | V | V | | V | F | V | V | V | V | | V | F | F | V | F | F | | F | V | V | F | V | F | | F | V | F | F | V | F | | F | F | V | V | V | F | | F | F | F | V | F | F |   IMPLICACION solo es F si: V -> F  es CONJUNCION (Y/AND) solo es V si ambas son V |
| 4.j |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| p | q | r |  |  |
| V | V | V | V | V |
| V | V | F | V | F |
| V | F | V | V | V |
| V | F | F | V | F |
| F | V | V | V | V |
| F | V | F | V | F |
| F | F | V | F | F |
| F | F | F | F | F |

V es DISYUNCION (O) con que una sea V => es V. Solo es F si ambas son F

es CONJUNCION (Y/AND) solo es V si ambas son V

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1. Determine cuál de las proposiciones compuestas siguientes son tautologías y cuáles contradicciones (utilizando tabla de verdad):

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5.a | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | p | q |  |  |  |  |  | | V | V | F | F | V | F | V | | V | F | F | V | F | F | V | | F | V | V | F | V | F | V | | F | F | V | V | V | V | V |   Es una tautologia |
| 5.b | |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | p | q | r |  |  |  |  |  | | V | V | V | V | V | V | V | V | | V | V | F | V | F | F | F | V | | V | F | V | F | V | V | F | V | | V | F | F | F | V | F | F | V | | F | V | V | V | V | V | F | V | | F | V | F | V | F | V | F | V | | F | F | V | V | V | V | V | V | | F | F | F | V | V | V | V | V |   Es tautologia |
| 5.c | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | p | q | r |  |  |  |  | | V | V | V | V | F | V | F | | V | V | F | F | V | V | F | | V | F | V | V | F | F | F | | V | F | F | V | F | F | F | | F | V | V | V | F | V | F | | F | V | F | F | V | V | F | | F | F | V | V | F | V | F | | F | F | F | V | F | V | F |   Es una contradiccion |
| 5.d | |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | p | q | r |  |  |  |  |  | | V | V | V | V | V | V | V | V | | V | V | F | V | F | F | F | V | | V | F | V | V | V | V | F | V | | V | F | F | V | F | V | F | V | | F | V | V | V | V | V | V | V | | F | V | F | V | V | F | F | V | | F | F | V | F | V | V | F | V | | F | F | F | F | V | V | F | V |   Es tautología |
| 5.e | ES UNA TAUTOLOGIA   |  |  |  |  | | --- | --- | --- | --- | | p | q |  |  | | V | V | V | V | | V | F | V | V | | F | V | V | V | | F | F | F | V | |
| 5.f | es una CONTRADICCION |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| p | q |  |  |  |
| V | V | F | F | F |
| V | F | F | F | F |
| F | V | V | V | F |
| F | F | V | F | F |

1. Demuestre mediante tabla de verdad, las siguientes leyes del álgebra proposicional

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 6.a) | Negación | |  |  |  | | --- | --- | --- | | p |  |  | | V | F | V | | F | V | F | |
| 6.b) | Idempotencia | |  |  |  |  | | --- | --- | --- | --- | | p |  |  | p | | V | V |  | V | | F | F |  | F |   es CONJUNCION (Y/AND)  Solo es VERDADERA si ambas son VERDADERAS |
|  |  |  |
|  |  | |  |  |  |  | | --- | --- | --- | --- | | p |  |  | p | | V | V |  | V | | F | F |  | F |   V es DISYUNCION (O) con que una sea VERDADERA, entonces es VERDADERA.  Solo es FALSA si ambas son FALSAS |
| 6.c) | Asociativa | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | p | q | r |  |  |  |  | | V | V | V | V | V | V | V | | V | V | F | V | F | F | F | | V | F | V | F | F | F | F | | V | F | F | F | F | F | F | | F | V | V | F | F | V | F | | F | V | F | F | F | F | F | | F | F | V | F | F | F | F | | F | F | F | F | F | F | F | |
| 6.d) | Conmutativa | |  |  |  |  | | --- | --- | --- | --- | | p | q |  |  | | V | V | V | V | | V | F | F | F | | F | V | F | F | | F | V | F | F | |
| 6.e) | Absorción | |  |  |  |  | | --- | --- | --- | --- | | p | q |  |  | | V | V | V | V | | V | F | F | V | | F | V | F | F | | F | F | F | F | |
|  |  |  |
| 6.f) | Distributiva |  |
|  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| p | q | r |  |  |  |  |  |
| V | V | V | V | V | V | V | V |
| V | V | F | F | V | V | V | V |
| V | F | V | F | V | V | V | V |
| V | F | F | F | V | V | V | V |
| F | V | V | V | V | V | V | V |
| F | V | F | F | F | V | F | F |
| F | F | V | F | F | F | V | F |
| F | F | F | F | F | F | F | F |