|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| q | r | (q -> r) | (q v r) | (q -> r) ^ (q v r) |
| v | v | v | v | v |
| v | f | f | V | f |
| f | v | v | v | v |
| f | f | v | f | f |

4) a) (q -> r) ^ (q v r)

b) ~ (p v (p -> ~q))

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| p | q | ~q | (p -> ~q) | (p v (p -> ~q)) | ~ |
| v | v | f | F | V | f |
| v | f | V | V | V | f |
| f | v | f | V | V | f |
| f | f | v | v | v | f |

Contradição

c) q v (~p ^ q)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| p | q | ~p | (~p ^ q) | q v (~p ^ q) |
| v | v | f | f | v |
| v | f | f | f | f |
| f | v | v | v | v |
| f | f | v | f | f |

d) (p -> ~q) v (~q ^ p)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| p | q | ~q | (p -> ~q) | (~q ^ p) | (p -> ~q) v (~q ^ p) |
| v | v | f | F | f | f |
| v | f | v | V | v | v |
| f | v | f | V | f | v |
| f | f | v | v | f | v |

e) (p v (p -> q)) v p

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| p | q | (p -> q) | (p v (p -> q)) | (p v (p -> q)) v p |
| v | v | v | v | v |
| v | f | f | v | v |
| f | v | f | v | v |
| f | f | v | v | v |

Tautologia