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Chapter No: 1

Section No: 1

Problem No: 32

Question: Construct a truth table for each of these compound propositions.

Answer:

a) p → ¬ p

|  |  |  |
| --- | --- | --- |
| p | ¬ p | p → ¬ p |
| T | F | F |
| F | T | T |

b) p ↔ ¬ p

|  |  |  |
| --- | --- | --- |
| p | ¬ p | p ↔ ¬ p |
| T | F | F |
| F | T | F |

c) p ⊕ (p ∨ q)

|  |  |  |  |
| --- | --- | --- | --- |
| p | q | p ∨ q | p ⊕ (p ∨ q) |
| T | T | T | F |
| T | F | T | F |
| F | T | T | T |
| F | F | F | F |

d) ( p ∧ q ) → ( p ∨ q )

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| p | q | p ∨ q | p ∧ q | ( p ∧ q ) → ( p ∨ q ) |
| T | T | T | T | T |
| T | F | T | F | T |
| F | T | T | F | T |
| F | F | F | F | T |

e) (q → ¬p) ↔ (p ↔ q)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| p | q | ¬p | q → ¬p | p ↔ q | (q → ¬p) ↔ (p ↔ q) |
| T | T | F | F | T | F |
| T | F | F | T | F | F |
| F | T | T | T | F | F |
| F | F | T | T | T | T |

f) (p ↔ q) ⊕ ( p ↔ ¬ q )

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| p | q | ¬q | p ↔ ¬q | p ↔ q | ((p ↔ q) ⊕ (p ↔ ¬q) |
| T | T | F | F | T | T |
| T | F | T | T | F | T |
| F | T | F | T | F | T |
| F | F | T | F | T | T |