**Propositional Logic**

**Tutorial-1**

**Question 1**

1. Construct the truth table of
2. Construct the truth table of
3. Construct the truth tables of :

**Question 2**

Show that is a tautology.

**Question 3**

What can you say about the following compound propositions?

|  |  |  |  |
| --- | --- | --- | --- |
| **P** | **Q** |  | **OUT** |
| **F** | **F** | **F** | **F** |
| **F** | **T** | **T** | **F** |
| **T** | **F** | **T** | **T** |
| **T** | **T** | **T** | **T** |

Its contingent proportional

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **P** | **Q** |  |  | **OUT** |
| **F** | **F** | **T** | **F** | **F** |
| **F** | **T** | **F** | **T** | **F** |
| **T** | **F** | **T** | **F** | **F** |
| **T** | **T** | **T** | **F** | **F** |

It’s a contradiction

1. (

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **P** | **Q** |  | **~P** |  | OUT |
| **F** | **F** | **T** | **T** | **T** | **T** |
| **F** | **T** | **T** | **T** | **T** | **T** |
| **T** | **F** | **F** | **F** | **F** | **T** |
| **T** | **T** | **T** | **F** | **T** | **T** |

It’s a Tautology

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **P** | **Q** | **~Q** |  | **OUT** |  |
| **F** | **F** | **T** | **T** | **F** |  |
| **F** | **T** | **F** | **T** | **F** |  |
| **T** | **F** | **T** | **T** | **T** |  |
| **T** | **T** | **F** | **T** | **T** |  |

It’s a Contingent proportional

**Question 4**

State whether the following compound propositions are tautologies, contradictions or contingent propositions:

1. q p

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **P** | **Q** | **~Q** |  | q p | **OUT** |
| **F** | **F** | **T** | **F** | **F** | **T** |
| **F** | **T** | **F** | **F** | **T** | **T** |
| **T** | **F** | **T** | **T** | **T** | **T** |
| **T** | **T** | **F** | **F** | **T** | **T** |

**It is a tautology.**

1. (p q) (p q)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **P** | **Q** | (p q) | (p q) | (p q) | **OUT** |
| **F** | **F** | **F** | **F** | **T** | **F** |
| **F** | **T** | **F** | **T** | **F** | **F** |
| **T** | **F** | **F** | **T** | **F** | **F** |
| **T** | **T** | **T** | **T** | **F** | **F** |

**It is a contradiction**

1. (p r) ⇔ (r p)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **P** | **R** | (p r) | (p r) | (r p) | **OUT** |
| **F** | **F** | **F** | **T** | **T** | **T** |
| **F** | **T** | **F** | **T** | **T** | **T** |
| **T** | **F** | **F** | **T** | **T** | **T** |
| **T** | **T** | **T** | **F** | **F** | **T** |

**It is a tautology.**

1. p q

|  |  |  |  |
| --- | --- | --- | --- |
| **P** | **Q** | **~Q** | p q |
| **F** | **F** | **T** | **T** |
| **F** | **T** | **F** | **T** |
| **T** | **F** | **T** | **T** |
| **T** | **T** | **F** | **T** |

**It is a tautology.**

1. p ⇔ ( p q)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **P** | **Q** | **~P** | ( p q) | OUT |
| **F** | **F** | **T** | **F** | **T** |
| **F** | **T** | **T** | **T** | **F** |
| **T** | **F** | **F** | **F** | **F** |
| **T** | **T** | **F** | **F** | **F** |

**It is a contingent**

1. q r r

|  |  |  |  |
| --- | --- | --- | --- |
| **Q** | **R** | **~R** | q r r |
| **F** | **F** | **T** | **F** |
| **F** | **T** | **F** | **F** |
| **T** | **F** | **T** | **F** |
| **T** | **T** | **F** | **F** |

**It is a contradiction**