**Chapter 9 Practice Problems**

**Problems Only**

1. (p --> q) V q

|  |  |  |  |
| --- | --- | --- | --- |
| p | q | p --> q | (p --> q) V q |
| **T** | **T** |  |  |
| **T** | **F** |  |  |
| **F** | **T** |  |  |
| **F** | **F** |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. a --> (a & b)

|  |  |  |  |
| --- | --- | --- | --- |
| a | b | a & b | a --> (a & b) |
| **T** | **T** |  |  |
| **T** | **F** |  |  |
| **F** | **T** |  |  |
| **F** | **F** |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. p --> (p V q)

|  |  |  |  |
| --- | --- | --- | --- |
| p | q | p V q | p --> (p V q) |
| **T** | **T** |  |  |
| **T** | **F** |  |  |
| **F** | **T** |  |  |
| **F** | **F** |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. ~a <--> ~b

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| a | b | ~ a | ~b | ~a <--> ~b |
| **T** | **T** |  |  |  |
| **T** | **F** |  |  |  |
| **F** | **T** |  |  |  |
| **F** | **F** |  |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. (x & y) --> (y & x)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| x | y | x & y | y & x | (x & y) --> (y & x) |
| **T** | **T** |  |  |  |
| **T** | **F** |  |  |  |
| **F** | **T** |  |  |  |
| **F** | **F** |  |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. ~(p V q) --> ~p

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| p | q | ~p | p V q | ~(p V q) | ~(p V q) --> ~p |
| **T** | **T** |  |  |  |  |
| **T** | **F** |  |  |  |  |
| **F** | **T** |  |  |  |  |
| **F** | **F** |  |  |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. (x & y) <--> (~x V ~y)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| x | y | x & y | ~x | ~y | ~x V ~y | (x & y) <--> (~x V ~y) |
| **T** | **T** |  |  |  |  |  |
| **T** | **F** |  |  |  |  |  |
| **F** | **T** |  |  |  |  |  |
| **F** | **F** |  |  |  |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. (p & q) V (~p V ~q)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| p | q | p & q | ~p | ~q | ~p V ~q | (p & q) V (~p V ~q) |
| **T** | **T** |  |  |  |  |  |
| **T** | **F** |  |  |  |  |  |
| **F** | **T** |  |  |  |  |  |
| **F** | **F** |  |  |  |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. ~(a V b) --> (a & ~b)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| a | b | a V b | ~(a V b) | ~b | a & ~b | ~(a V b) --> (a & ~b) |
| **T** | **T** |  |  |  |  |  |
| **T** | **F** |  |  |  |  |  |
| **F** | **T** |  |  |  |  |  |
| **F** | **F** |  |  |  |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. (x V ~x) --> (y & ~y)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| x | y | ~x | x V ~x | ~y | y & ~y | (x V ~x) --> (y & ~y) |
| **T** | **T** |  |  |  |  |  |
| **T** | **F** |  |  |  |  |  |
| **F** | **T** |  |  |  |  |  |
| **F** | **F** |  |  |  |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. ((p V q) & ~q) --> p

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| p | q | ~q | p V q | (p V q) & ~q | ((p V q) & ~q) --> p |
| **T** | **T** |  |  |  |  |
| **T** | **F** |  |  |  |  |
| **F** | **T** |  |  |  |  |
| **F** | **F** |  |  |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. (x --> y) V (~x --> ~y)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| x | y | x --> y | ~x | ~y | ~x --> ~y | (x --> y) V (~x -->~y) |
| **T** | **T** |  |  |  |  |  |
| **T** | **F** |  |  |  |  |  |
| **F** | **T** |  |  |  |  |  |
| **F** | **F** |  |  |  |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. (p & q) --> ~(q V p)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| p | q | p & q | q V p | ~(q V p) | (p & q) --> ~(q V p) |
| **T** | **T** |  |  |  |  |
| **T** | **F** |  |  |  |  |
| **F** | **T** |  |  |  |  |
| **F** | **F** |  |  |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. (a --> b) & ~ (~a V b)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| a | b | a --> b | ~a | ~a V b | ~(~a V b) | (a --> b) & ~(~a V b) |
| **T** | **T** |  |  |  |  |  |
| **T** | **F** |  |  |  |  |  |
| **F** | **T** |  |  |  |  |  |
| **F** | **F** |  |  |  |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. ~(p --> q) & ~(q --> p)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| p | q | p --> q | ~(p --> q) | q --> p | ~(q --> p) | ~(p --> q) & ~(q --> p) |
| **T** | **T** |  |  |  |  |  |
| **T** | **F** |  |  |  |  |  |
| **F** | **T** |  |  |  |  |  |
| **F** | **F** |  |  |  |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. ((x & y) V (x V y)) V (x -->y)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| x | y | x & y | x V y | (x & y) V (x V y) | x --> y | ((x & y) V (x V y)) V (x --> y) |
| **T** | **T** |  |  |  |  |  |
| **T** | **F** |  |  |  |  |  |
| **F** | **T** |  |  |  |  |  |
| **F** | **F** |  |  |  |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. (p & q) V r

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| p | q | r | p & q | (p & q) V r |
| **T** | **T** | **T** |  |  |
| **T** | **T** | **F** |  |  |
| **T** | **F** | **T** |  |  |
| **T** | **F** | **F** |  |  |
| **F** | **T** | **T** |  |  |
| **F** | **T** | **F** |  |  |
| **F** | **F** | **T** |  |  |
| **F** | **F** | **F** |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. ~(~a V b) <--> ~(a-->b)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | ~a | ~a V b | ~(~a V b) | a --> b | ~(a --> b) | ~(~a V b) <--> ~(a --> b) |
| **T** | **T** |  |  |  |  |  |  |
| **T** | **F** |  |  |  |  |  |  |
| **F** | **T** |  |  |  |  |  |  |
| **F** | **F** |  |  |  |  |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. (x --> y) --> ~(y V ~x)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| x | y | x --> y | ~x | y V ~x | ~(y V ~x) | (x --> y) --> ~(y V ~x) |
| **T** | **T** |  |  |  |  |  |
| **T** | **F** |  |  |  |  |  |
| **F** | **T** |  |  |  |  |  |
| **F** | **F** |  |  |  |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. (~a V b) & (~b V a) --> (a <--> b)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | ~a | ~a V b | ~b | ~b V a | (~a V b) & (~b V a) | (a <--> b) | (~a V b) & (~b V a) --> (a <--> b) |
| **T** | **T** |  |  |  |  |  |  |  |
| **T** | **F** |  |  |  |  |  |  |  |
| **F** | **T** |  |  |  |  |  |  |  |
| **F** | **F** |  |  |  |  |  |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. (p --> q) <--> ~(q V ~p)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| p | q | p --> q | ~p | q V ~p | ~(q V ~p) | (p --> q) <--> ~(q V ~p) |
| **T** | **T** |  |  |  |  |  |
| **T** | **F** |  |  |  |  |  |
| **F** | **T** |  |  |  |  |  |
| **F** | **F** |  |  |  |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. ((x --> y) V (y --> x)) & (x V ~x)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| x | y | x --> y | y --> x | (x --> y) V (y --> x) | ~x | x V ~x | ((x --> y) V (y --> x)) & (x V ~x) |
| **T** | **T** |  |  |  |  |  |  |
| **T** | **F** |  |  |  |  |  |  |
| **F** | **T** |  |  |  |  |  |  |
| **F** | **F** |  |  |  |  |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. ((p & ~q) V (p & q)) <--> (p -->q)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| p | q | ~q | p & ~q | p & q | (p & ~q) V (p & q) | p --> q | ((p & ~q) V (p & q)) <--> (p -->q) |
| **T** | **T** |  |  |  |  |  |  |
| **T** | **F** |  |  |  |  |  |  |
| **F** | **T** |  |  |  |  |  |  |
| **F** | **F** |  |  |  |  |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. ((a -->b) & (b --> c)) --> (a --> c)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | a --> b | b --> c | (a --> b) & (b --> c) | a --> c | ((a --> b) & (b --> c)) --> (a --> c) |
| **T** | **T** | **T** |  |  |  |  |  |
| **T** | **T** | **F** |  |  |  |  |  |
| **T** | **F** | **T** |  |  |  |  |  |
| **T** | **F** | **F** |  |  |  |  |  |
| **F** | **T** | **T** |  |  |  |  |  |
| **F** | **T** | **F** |  |  |  |  |  |
| **F** | **F** | **T** |  |  |  |  |  |
| **F** | **F** | **F** |  |  |  |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent

1. ((p V q) & (p V r)) <--> ~(p V (q & r))

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| p | q | r | p V q | p V r | (p V q)&(p V r) | q & r | p V (q & r) | ~(p V (q& r)) | ((p V q) & (p V r)) <--> ~(p V (q & r)) |
| **T** | **T** | **T** |  |  |  |  |  |  |  |
| **T** | **T** | **F** |  |  |  |  |  |  |  |
| **T** | **F** | **T** |  |  |  |  |  |  |  |
| **T** | **F** | **F** |  |  |  |  |  |  |  |
| **F** | **T** | **T** |  |  |  |  |  |  |  |
| **F** | **T** | **F** |  |  |  |  |  |  |  |
| **F** | **F** | **T** |  |  |  |  |  |  |  |
| **F** | **F** | **F** |  |  |  |  |  |  |  |

Which of these describes the previous formula?

* Tautology
* Contradiction
* Contingent