Class Activity 6

1. Propositional Theorem: Decide whether each of the following sentences is valid, unsatisfiable, or neither. Verify your decisions using truth tables.
2. Smoke → Smoke: Valid

|  |  |  |
| --- | --- | --- |
| Smoke | Smoke → Smoke | Smoke V ¬Smoke |
| T | T | T |
| F | T | T |

1. Smoke → Fire: Neither

|  |  |  |
| --- | --- | --- |
| Smoke | Fire | Smoke → Fire |
| T | T | T |
| T | F | F |
| F | F | T |
| F | T | T |

1. Smoke V Fire V ¬Fire: Valid

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Smoke | Fire | ¬Fire | Smoke V Fire | (Smoke V Fire) V ¬Fire |
| T | T | F | T | T |
| T | F | T | T | T |
| F | F | T | F | T |
| F | T | F | T | T |

1. Smoke V Fire V (Smoke → Fire): Valid

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Smoke | Fire | Smoke V Fire | Smoke → Fire | (Smoke V Fire) V (Smoke → Fire) |
| T | T | T | T | T |
| T | F | T | F | T |
| F | T | T | T | T |
| F | F | F | T | T |

1. (Fire Ʌ Smoke) V ¬Smoke: Neither

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Fire | Smoke | ¬Smoke | Fire Ʌ Smoke | (Fire Ʌ Smoke) V ¬Smoke |
| T | T | F | T | T |
| T | F | T | F | T |
| F | T | F | F | F |
| F | F | T | F | F |

1. Using the joint probability table for the random variables A, B, C shown below.

|  |  |  |  |
| --- | --- | --- | --- |
| **A** | **B** | **C** | **P(A, B, C)** |
| False | False | False | 0.05 |
| False | False | True | 0.10 |
| False | True | False | 0.03 |
| False | True | True | 0.25 |
| True | False | False | 0.15 |
| True | False | True | 0.02 |
| True | True | False | 0.07 |
| True | True | True | 0.33 |

1. Compute the probability P(A = true): 57%
2. Compute the probability P(A = true, B = false): 17%
3. Compute the probability P(A = false | C = true): 50%
4. Compute the probability P(A = true, B = false | C = false): 50%
5. Compute the probability P(A = true | C = false): 73.3%