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COT 3100 – Computational Structures

Assignment 1

8/28/2016

Section 1.1 pp 12-15

2. c. There are no black flies in Maine. The truth value is T.

e. The moon is made of green cheese. The truth value is F.

12.

a. If you have the flu, then you miss the final examination.

b. It is not that case that you miss the final examination if and only if you pass the course.

c. If you miss the final examination, it is not the case that you pass the course.

d. You have the flu or you miss the final examination or you pass the course.

e. If you have the flu, then it is not the case that you case the course or, if you miss the final examination then it is not the case that you pass the course.

f. You have the flu and you miss the final examination or it is not the case that you pass the final examination and you pass the course.

14.

a. p∧¬q

b. (p∧q)∧r

c. p→r

d. (p∧¬q)∧r

e. (p∧q) → r

f. (q∨p) ⇔ r

26.

a. You will get an A in this course if and only if you learn how to solve discrete mathematics problems.

b. You will be informed if and only if you read the newspaper every day.

c. It rains if and only if it is a weekend day.

d. You can see the wizard if and only if the wizard is not in.

28. a.

Converse: If I stay at home, then it will snow tonight.

Contrapositive: If I don’t stay at home, then it won’t snow tonight.

Inverse: If It doesn’t snow tonight, then I won’t stay home.

b.

Converse: Whenever I go to the beach, it is a sunny summer day.

Contrapositive: Whenever I don’t go to the beach, it is not a sunny summer day.

Inverse: I don’t go to the beach whenever it’s not a sunny summer day.

**c.**

Converse: When I sleep until noon, it is necessary that I stay up late.

Contrapositive: When I don’t sleep until noon, it isn’t necessary that I stay up late.

Inverse: When I don’t stay up late, it isn’t necessary that I sleep until noon.

32. d.

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

e.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 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 |

34. d.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| p | q | ¬p | ¬q | ¬p⊕ ¬q |
| T | T | F | F | F |
| T | F | F | T | T |
| F | T | T | F | T |
| F | F | T | T | F |

e.

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

35.

d.

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

e.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| p | q | ¬p | p⇔q | ¬p ⇔ q | (p⇔q) ∨ (¬p ⇔ q) |
| T | T | F | T | F | T |
| T | F | F | F | T | T |
| F | T | T | F | T | T |
| F | F | T | T | F | T |

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4. a.

\*See next page

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| p | q | r | pVq | (pVq)Vr | qVr | pV(qVr) |
| T | T | T | T | T | T | T |
| T | T | F | T | T | T | T |
| T | F | T | T | T | T | T |
| T | F | F | T | T | F | T |
| F | T | T | T | T | T | T |
| F | T | F | T | T | T | T |
| F | F | T | F | T | T | T |
| F | F | F | F | F | F | F |

b.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| p | q | r | p∧q | (p∧q)∧r | q∧r | p∧(q∧r) |
| T | T | T | T | T | T | T |
| T | T | F | T | F | F | F |
| T | F | T | F | F | F | F |
| T | F | F | F | F | F | F |
| F | T | T | F | F | T | F |
| F | T | F | F | F | F | F |
| F | F | T | F | F | F | F |
| F | F | F | F | F | F | F |

.

6.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| p | q | r | p∧q | ¬(p∧q) | ¬p | ¬q | ¬pV¬q |
| T | T | T | T | F | F | F | F |
| T | T | F | T | F | F | F | F |
| T | F | T | F | T | F | T | T |
| T | F | F | F | T | F | T | T |
| F | T | T | F | T | T | F | T |
| F | T | F | F | T | T | F | T |
| F | F | T | F | T | T | T | T |
| F | F | F | F | T | T | T | T |

14.

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

It is not a tautology because the truth value is false when (¬p∧( p→q)) is T and ¬q is F

16.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| p | q | p⇔q | p∧q | ¬p | ¬q | ¬p ∧¬q | (p∧q)V(¬p ∧¬q) |
| T | T | T | T | F | F | F | T |
| T | F | F | F | F | T | F | F |
| F | T | F | F | T | F | F | F |
| F | F | T | F | T | T | T | T |

30.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| p | q | r | pVq | ¬p | ¬pVr | (pVq)∧( ¬pVr) | qVr | (pVq)∧( ¬pVr) → (qVr) |
| T | T | T | T | F | T | T | T | T |
| T | T | F | T | F | F | F | T | T |
| T | F | T | T | F | T | T | T | T |
| T | F | F | T | F | F | F | F | T |
| F | T | T | T | T | T | T | T | T |
| F | T | F | T | T | T | T | T | T |
| F | F | T | F | T | T | F | T | T |
| F | F | F | F | T | T | F | F | T |

It’s a tautology because every truth value is true.