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Week 2 Homework:

Section 1.3: 5, 7, 10, 15, 17, 31, 58

#5

p	q	r	q ∨ r	p ∧ (q ∨ r)	p ∧ q	p ∧ r	(p ∧ q) ∨ (p ∧ r)
T	T	T	T	T	T	T	T
T	T	F	T	T	T	F	T
T	F	T	T	T	F	T	T
F	T	T	T	F	F	F	F
T	F	F	F	F	F	F	F
F	T	F	T	F	F	F	F
F	F	T	T	F	F	F	F
F	F	F	F	F	F	F	F

#7

   a.   Jan is not rich or is not happy.

   b.   Carlos will not bicycle and will not run tomorrow.

   c.   Mei does not walk and does not take the bus to class.

   d.   Ibrahim is not smart or is not hard working.

#10

   a.

p	q	¬ p	p ∨ q	¬ p ∧ (p ∨ q)	(¬ p ∧ (p ∨ q)) → q
T	T	F	T	F	T
T	F	F	T	F	T
F	T	T	T	T	T
F	F	T	F	F	T

   b.

p	q	r	p → q	q → r	((p → q) ∧ (q → r))	p → r	((p → q) ∧ (q → r)) → (p → r)
T	T	T	T	T	T	T	T
T	T	F	T	F	F	F	T

T	F	T	F	T	F	T	T
F	T	T	T	T	T	T	T
T	F	F	F	T	F	F	T
F	F	T	T	T	T	T	T
F	T	F	T	F	F	T	T
F	F	F	T	T	T	T	T

c.

p	q	p → q	p ∧ (p → q)	(p ∧ (p → q)) → q
T	T	T	T	T
T	F	F	F	T
F	T	T	F	T
F	F	T	F	T

d.

p	q	r	p ∨ q	p → r	(p ∨ q) ∧ (p → r)	q → r	(p ∨ q) ∧ (p → r) ∧ (q → r)	((p ∨ q) ∧ (p → r) ∧ (q → r)) → r
T	T	T	T	T	T	T	T	T
T	T	F	T	F	F	F	F	T
T	F	T	T	T	T	T	T	T
F	T	T	T	T	T	T	T	T
T	F	F	T	F	F	T	F	T
F	F	T	F	T	F	T	F	T
F	T	F	T	T	T	F	F	T
F	F	F	F	T	F	T	F	T

#15   It's a tautology.

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

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#17   They're logically equivalent.

p	q	p ↔ q	¬ (p ↔ q)	¬ q	p ↔ ¬ q
T	T	T	F	F	F
T	F	F	T	T	T
F	T	F	T	F	T
F	F	T	F	T	F

#31   They're not logically equivalent.

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	T	T	T
F	T	T	T	T	T	T
T	F	F	F	T	T	T
F	F	T	T	T	T	T
F	T	F	T	F	F	T
F	F	F	T	F	T	T

#58

All five.

Section 2.1: 3, 5, 7, 9, 10, 14, 21, 35, 37

#3

    a. The second is a subset of the first.

    b. Neither is a subset of the other.

    c. The first is a subset of the second.

#5

    a. They are equal.

    b. They are not equal.

    c. They are not equal.

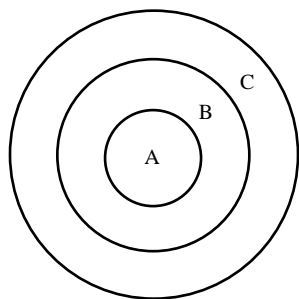#7

    a. Yes

    b. No

    c. Yes

    d. No

    e. No

#9

    a. False

    b. False

    c. False

    d. True

    e. False

    f. False

    g. True

#10

    a. True

    b. True

    c. False

    d. True

    e. True

    f. False

    g. False

#14

#21

    a. $P(\{a\}) = \{\emptyset, \{a\}\}$

    b. $P(\{a, b\}) = \{\emptyset, \{a\}, \{b\}, \{a, b\}\}$

    c. $P(\{\emptyset, \{\emptyset\}\}) = \{\emptyset, \{\emptyset\}, \{\emptyset, \{\emptyset\}\}\}$

#35

mn

#37

m^n