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HW Chapter 6

Indicate whether each of the following sentences expresses a propositional con-junction or a non-propositional conjunction—that is, whether or not it expresses a conjunction of two propositions. If the sentence could be either, then specify a context in which it would naturally be used to express a propositional conjunction and a different context in which it would naturally be used to express a non-propositional conjunction.

1. A Catholic priest married John and Mary.

Non-propositional

This doesn’t mean:

John was married by a priest; Mary was married by a priest.

It means

John and Mary were married to each other by the priest.

2. Fred had pie and ice cream for dessert.

Propositional

Fred had not just pie, but also ice cream for dessert.

()Pie for dessert

()Ice cream for dessert

()∴Fred had ice cream dessert

3. The winning presidential candidate rarely loses both New York and California.

Non-propositional

According to this, a winning candidate does not have to win both NY and Cali to win the election. But most do.

4. Susan got married and had a child.

Propositional

Susan both had a child and got married.

()Had a child

()Got married

()∴Had a child and got married

5. Jane speaks both French and English.

Propositional

This is stating that Jane speaks two languages, French and English.

6. Someone who speaks both French and English is bilingual.

Non-propositional

~~() Speaks French = bilingual~~

~~() Speaks English = bilingual~~

∴() Speaks French + English = bilingual

7. Ken and Naomi are two of my best friends.

Propositional

Ken is my best friend and Naomi is my best friend, so they are both my best friend

() Ken = a best friend

() Naomi = a best friend

∴() Ken and Naomi are two of my best friends

8. Miranda and Nick cooked dinner.

Non-propositional

I read this as “Miranda and Nick cooked dinner together”. Miranda cooked + Nick cooked doesn’t equal they cooked together.

9. I doubt that John is poor and happy.

Non-propositional

Doubting John is poor + Doubting John is happy doesn’t equal anything. You cannot infer one of these from another.

Are the following arguments valid by virtue of their propositional form? Why or why not?

1. Donald owns a tower in New York and a palace in Atlantic City. Therefore, Donald owns a palace in Atlantic City.

Valid by virtue of propositional form

(1) Donald owns property in NY

(2) Donald owns property in Atlantic City

∴(3) Donald owns property in Atlantic City

2. Tom owns a house. Therefore, Tom owns a house and a piece of land.

3. Ilsa is tall. Therefore, Ilsa is tall, and Ilsa is tall.

Valid by virtue of propositional form

(1) Ilsa is tall

(2) Ilsa is tall

∴(3) Therefore, Ilsa is tall

4. Bernie has a son and a daughter. Bernie has a father and a mother. Therefore, Bernie has a son and a mother.

Valid by virtue of propositional form

(1) Bernie has a son and a daughter

(2) Bernie has a father and a mother

∴(3) Bernie has a son and a mother

5. Mary got married and had a child. Therefore, Mary had a child and got married.

Valid by virtue of propositional form

6. Bess and Katie tied for MVP. Therefore, Bess tied for MVP.

Valid by virtue of propositional form

(1) Bess tied for MVP

(2) Katie tied for MVP

∴(3) Bess tied for MVP

Given that “A”, “B,” and “C” are true propositions and “X,” “Y,” and “Z” are false propositions, determine the truth values of the following compound propositions:

2. ~(X v Y)

~(F v F)

~F

**True**

4. ~(Z v ~Z)

~(F v ~F)

~(F v T)

~T

**False**

6. (A v Z) & B

(T v F) & T

T & T

**True**

8. (A & Z) v (B & Z)

(T & F) v (T & F)

F v F

**False**

10. ~(A v ~(Z v X))

~(T v ~(F v F))

~(T v T)

~T

**False**

12. ~Z v (Z & A)

~F v (F & T)

~F v F

~F

**True**

14. ~((Z v Z) & A)

~((T v T) & F)

~(T & F)

~F

**True**

16. A & ((~B & C) v ~(~B v ~(Z v B)))

T & ((~T & T) v ~(~T v ~(F v T)))

T & ((F & T) v ~(F v ~F))

T & (F v ~(F v T))

T & (F v ~T)

T & (F v F)

T & T

**True**

Using the truth table technique outlined above, test the following argument forms of validity:

1.

~ P v Q

P\_\_\_\_\_\_\_

∴~ Q

**Invalid**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| P | Q | ~ P v Q | P | ~ Q |  |
| T | T | T | T | F | Invalid |
| T | F | F | T | T |  |
| F | T | T | F | F |  |
| F | F | T | F | T |  |

3.

~(P v Q)

P\_\_\_\_\_\_\_

∴Q

**Valid**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q | ~(P v Q) | P | Q |
| T | T | F | T | T |
| T | F | F | T | F |
| F | T | F | F | T |
| F | F | T | F | F |

5.

~(P & Q)

Q\_\_\_\_\_\_\_

∴~P

**Valid**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q | ~(P & Q) | Q | ~P |
| T | T | F | T | F |
| T | F | T | F | F |
| F | T | T | T | T |
| F | F | T | F | T |

7.

(P & Q) v (P & R)

∴P & (Q v R)

**Valid**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q | R | (P & Q) v (P & R) | P & (Q v R) |
| T | T | T | T | T |
| T | T | F | T | T |
| T | F | T | T | T |
| T | F | F | F | F |
| F | T | T | F | F |
| F | T | F | F | F |
| F | F | T | F | F |
| F | F | F | F | F |

9.

P & Q\_\_\_\_\_\_

∴(P v R) & (Q v R)

**Invalid**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| P | Q | R | P & Q | (P v R) & (Q v R) |  |
| T | T | T | T | T |  |
| T | T | F | T | T |  |
| T | F | T | F | T | Invalid |
| T | F | F | F | F |  |
| F | T | T | F | T | Invalid |
| F | T | F | F | F |  |
| F | F | T | F | T | Invalid |
| F | F | F | F | F |  |

Using the truth table techniques employed above, test the following argument forms for validity. (For your own entertainment, guess whether the argument form is valid or invalid before working it out.)

5.

P⊃Q

Q⊃R

~R\_\_\_\_\_\_

∴~P

**Valid**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| P | Q | R | P⊃Q | Q⊃R | ~R | ~P |
| T | T | T | T | T | F | F |
| T | T | F | T | F | T | F |
| T | F | T | F | T | F | F |
| T | F | F | F | T | T | F |
| F | T | T | T | T | F | T |
| F | T | F | T | F | T | T |
| F | F | T | T | T | F | T |
| F | F | F | T | T | T | T |

7.

P v Q

P⊃Q

Q⊃R\_\_\_\_

∴R

**Valid**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| P | Q | R | P v Q | P⊃Q | Q⊃R | R |
| T | T | T | T | T | T | T |
| T | T | F | T | T | F | F |
| T | F | T | T | F | T | T |
| T | F | F | T | F | T | F |
| F | T | T | T | T | T | T |
| F | T | F | T | T | F | F |
| F | F | T | F | T | T | T |
| F | F | F | F | T | T | F |

13.

P⊃ (Q ⊃ R)

Q

~R\_\_\_\_\_\_

∴~P

**Valid**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| P | Q | R | P⊃ (Q ⊃ R) | Q | ~R | ~P |
| T | T | T | T | T | F | F |
| T | T | F | F | T | T | F |
| T | F | T | T | F | F | F |
| T | F | F | T | F | T | F |
| F | T | T | T | T | F | T |
| F | T | F | T | T | T | T |
| F | F | T | T | F | F | T |
| F | F | F | T | F | T | T |

18.

(P v Q) ⊃ (P & Q)

∴(P ⊃ Q) & (Q ⊃ P)

**Valid**

|  |  |  |  |
| --- | --- | --- | --- |
| P | Q | (P v Q) ⊃ (P & Q) | (P ⊃ Q) & (Q ⊃ P) |
| T | T | T | T |
| T | F | F | F |
| F | T | F | F |
| F | F | T | T |

(a) Translate each of the following arguments into symbolic notation.

Then (b)test each argument for truth-functional validity using truth table techniques, and

(c) comment on any violations of conversational rules.

6. If Bobby moves his queen there, he will lose her. Bobby will not lose his queen. Therefore, Bobby will not move his queen there. (M, L)

M ⊃ L

~L\_\_\_\_

∴~M

**Valid**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| M | L | M ⊃ L | ~L | ~M |
| T | T | T | F | F |
| T | F | F | T | F |
| F | T | T | F | T |
| F | F | T | T | T |

7. John will play only if the situation is hopeless. But the situation is hopeless. So John will play. (P, H)

P⊃H

H\_\_\_

∴P

**Valid**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | H | P ⊃ H | H | P |
| T | T | T | T | T |
| T | F | F | F | F |
| F | T | T | T | T |
| F | F | T | F | F |

8. Although Brown will pitch, the Rams will lose. If the Rams lose, their manager will get fired. So their manager will get fired. (B, L, F)

B & L

L⊃F

∴F

**Valid**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| B | L | F | B & L | L⊃F | F |
| T | T | T | T | T | F |
| T | T | F | T | F | T |
| T | F | T | F | T | T |
| T | F | F | F | T | F |
| F | T | T | F | T | T |
| F | T | F | F | F | F |
| F | F | T | F | T | T |
| F | F | F | F | T | F |

9. America will win the Olympics unless China does. China will win the Olympics unless Germany does. So America will win the Olympics unless Germany does. (A, C, G)

(A v C) &~(A & C)

(C v G) &~(C & G)

∴(A v G) &~(A & G)

**Invalid**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | C | G | (A v C) &~(A & C) | (C v G) &~(C & G) | (A v G) &~(A & G) |
| T | T | T | F | F | F |
| T | T | F | F | T | T |
| T | F | T | T | T | F |
| T | F | F | T | F | T |
| F | T | T | T | F | T |
| F | T | F | T | T | F |
| F | F | T | F | T | T |
| F | F | F | F | F | F |

10. If you dial 0, you will get the operator. So, if you dial 0 and do not get the operator, then there is something wrong with the telephone. (D, O, W)

D⊃O

∴(D & ~O) ⊃W

**Invalid**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| D | O | W | D⊃O | (D & ~O) ⊃W |  |
| T | T | T | T | T |  |
| T | T | F | T | T |  |
| T | F | T | F | T | Invalid |
| T | F | F | F | T | Invalid |
| F | T | T | T | T |  |
| F | T | F | T | T |  |
| F | F | T | T | T |  |
| F | F | F | T | T |  |

11. The Democrats will run either Jones or Borg. If Borg runs, they will lose the South. If Jones runs, they will lose the North. So the Democrats will lose either the North or the South. (J, B, S, N)

(J v B) & ~(J & B)

B⊃S

J⊃N

∴N v S

**Valid**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| J | B | S | N | (J v B) & ~(J & B) | B⊃S | J⊃N | N v S |
| T | T | T | T | F | T | T | T |
| T | T | T | F | F | T | F | T |
| T | T | F | T | F | F | T | T |
| T | T | F | F | F | F | F | F |
| T | F | T | T | T | T | T | T |
| T | F | T | F | T | T | F | T |
| T | F | F | T | T | T | T | T |
| T | F | F | F | T | T | F | F |
| F | T | T | T | T | T | T | T |
| F | T | T | F | T | T | T | T |
| F | T | F | T | T | F | T | T |
| F | T | F | F | T | F | T | F |
| F | F | T | T | F | T | T | T |
| F | F | T | F | F | T | T | T |
| F | F | F | T | F | T | T | T |
| F | F | F | F | F | T | T | F |

12. I am going to order either the fish special or the meat special. Either way, I will get soup. So I’ll get soup. (F, M, S)

F v M

(F v M) ⊃ S

∴S

**Valid**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| F | M | S | F v M | (F v M) ⊃ S | S |
| T | T | T | T | T | T |
| T | T | F | T | F | F |
| T | F | T | T | T | T |
| T | F | F | T | F | F |
| F | T | T | T | T | T |
| F | T | F | T | F | F |
| F | F | T | F | T | T |
| F | F | F | F | T | F |