

Section 1-5: Introduction to Logic

Exercises

State whether the following sentences are propositions.

1. On September 6, 2006, mathematicians proved that $2^{32582657}-1$ was a prime number.
2. Will you marry me?
3. Python is her favourite computing language.
4. What is your favourite computing language?
5. Please bring me a textbook.
6. The University of Victoria is located in Alberta.

Let p be “Rich is seven feet tall” and q be “Susan has brown hair.” Translate the following English sentences into logical notation.

7. Rich is seven feet tall or he is seven feet tall.
8. Either Rich is not seven feet tall or Susan does not have brown hair.
9. It is not true that Rich is seven feet tall or Susan has brown hair.
10. Rich is seven feet tall and Susan has brown hair.
11. Either Rich is seven feet tall or Susan does not have brown hair, but not both.

Which type of “or”, inclusive or exclusive, is meant in the following English sentences?

12. Do you want to sit inside or outside?
13. Have you seen the latest Harry Potter or Transformers movie?
14. I think I’ll get an A or a B in the course.
15. Is that the correct answer or not?
16. We need someone who speaks French or German.

Let p be “The moon is made of green cheese” and q be “The earth is made of green cheese.” Translate the following English sentences into logical notation.

17. Either the moon is made of green cheese or both the moon and the earth are made of green cheese.
18. The earth is made of green cheese and either the earth or the moon is made of green cheese.

19. Either the earth is made of green cheese while the moon is not, or the moon is made of green cheese.
20. The earth is made of green cheese and either the moon is made of green cheese or the earth is not.

Let p = "Jane did her homework" and q = "Jane went for a jog." Translate the following logical propositions into English sentences.

21. $p \wedge q$

22. $\overline{p \wedge q}$

23. $q \wedge \overline{p}$

24. $\overline{q} \vee \overline{p}$

25. $\overline{\overline{p}}$ (that's not(not p))

26. $q \oplus \overline{q}$

For each pair of sentences below, is the second sentence the negation of the first?

27. Pat owes Peter money. Peter owes Pat money.
28. The number of students in Math 161 is greater than 25. The number of students in Math 161 is less than 25.
29. Pat, the math instructor, is rich. Pat, the math instructor, is poor.

Answer the questions given the following situations. If you cannot answer the question, state whether "the situation is not possible" or "there's not enough information."

30. Jane went for a jog and did her homework. Did she go for a jog?
31. Jane went for a jog or did her homework. Did she not do her homework?
32. Jane went for a jog. Did she go for a jog and do her homework?
33. Jane did not go for a jog. Did she go for a jog and do her homework?