

ANSWER on Question #74711 – Math – Discrete Mathematics

QUESTION

Let p and q be the proposition

p : *You drive over 65 miles per hour.*

q : *You get a speeding ticket.*

Write these propositions using p and q and logical connectives (including negations).

- a) You do not drive over 65 miles per hour.
- b) You drive over 65 miles per hour, but you do not get a speeding ticket.
- c) You will get a speeding ticket if you drive over 65 miles per hour.
- d) If you do not drive over 65 miles per hour, then you will not get a speeding ticket.
- e) Driving over 65 miles per hour is sufficient for getting a speeding ticket.
- f) You get a speeding ticket, but you do not drive over 65 miles per hour.
- g) Whenever you get a speeding ticket, you are driving over 65 miles per hour.

SOLUTION

- a) You do not drive over 65 miles per hour.

This sentence is a negative to the sentence:” You drive over 65 miles per hour”.

Conclusion, in a symbolic form this sentence looks like this

<i>You do not drive over 65 miles per hour</i> : $\neg p$

b) You drive over 65 miles per hour, but you do not get a speeding ticket.

The sentence consists of two parts:

- 1) You drive over 65 miles per hour;
- 2) You do not get a speeding ticket.

This sentence is a negative to the sentence: "You get a speeding ticket".

Conclusion, in a symbolic form this sentence looks like this

You do not get a speeding ticket : $\neg q$

General conclusion, in a symbolic form initial sentence looks like this

You drive over 65 miles per hour, but you do not get a speeding ticket : $(p \wedge \neg q)$

c) You will get a speeding ticket if you drive over 65 miles per hour.

The sentence consists of two parts:

- 1) You drive over 65 miles per hour – "condition";
- 2) You will get a speeding ticket – "the result of the condition".

Conclusion, in a symbolic form this sentence looks like this

You will get a speeding ticket if you drive over 65 miles per hour : $(p \rightarrow q)$

d) If you do not drive over 65 miles per hour, then you will not get a speeding ticket

The sentence consists of two parts:

1) If you do not drive over 65 miles per hour - “condition”;

The sentence itself is a negative to the sentence:” You drive over 65 miles per hour”.

2) you will not get a speeding ticket - “the result of the condition”;

The sentence itself is a negative to the sentence:” You get a speeding ticket”.

Conclusion, in a symbolic form this sentence looks like this

If you do not drive over 65 miles per hour, then you will not get a speeding ticket :

$$\boxed{(\neg p \rightarrow \neg q)}$$

e) Driving over 65 miles per hour is sufficient for getting a speeding ticket.

The sentence consists of two parts:

1) Driving over 65 miles per hour – “condition”;

2) Sufficient for getting a speeding ticket – “the result of the condition”.

Conclusion, in a symbolic form this sentence looks like this

Driving over 65 miles per hour is sufficient for getting a speeding ticket: $(p \rightarrow q)$

f) You get a speeding ticket, but you do not drive over 65 miles per hour.

The sentence consists of two parts:

- 1) You get a speeding ticket;
- 2) You do not drive over 65 miles per hour.

This sentence is a negative to the sentence: "You drive over 65 miles per hour".

Conclusion, in a symbolic form this sentence looks like this

You do not get a speeding ticket : $\neg p$

General conclusion, in a symbolic form initial sentence looks like this

You get a speeding ticket, but you do not drive over 65 miles per hour : $(q \wedge \neg p)$

g) Whenever you get a speeding ticket, you are driving over 65 miles per hour.

The sentence consists of two parts:

- 1) Whenever you get a speeding ticket – "condition";
- 2) You are driving over 65 miles per hour – "the result of the condition".

Conclusion, in a symbolic form this sentence looks like this

You will get a speeding ticket if you drive over 65 miles per hour : $(q \rightarrow p)$

ANSWER:

a) $\neg p$

b) $p \wedge \neg q$

c) $p \rightarrow q$

d) $\neg p \rightarrow \neg q$

e) $p \rightarrow q$

f) $q \wedge \neg p$

g) $q \rightarrow p$