Question

Q: Let p and q be the propositions
p: It is below freezing.
q: It is snowing.
Write these propositions using p and q and logical connectives (including negations).
a) It is below freezing and snowing.
b) It is below freezing but not snowing.
c) It is not below freezing and it is not snowing.
d) It is either snowing or below freezing (or both).
e) If it is below freezing, it is also snowing.
f) Either it is below freezing or it is snowing, but it is not snowing if it is below freezing.
g) That it is below freezing is necessary and sufficient for it to be snowing.

Answer

a) \( p \land q \)
b) \( p \land \neg q \)
c) \( \neg p \land \neg q \)
d) \( p \lor q \)
e) \( p \rightarrow q \)
f) \( (p \lor q) \land (p \rightarrow \neg q) \)
g) \( p \leftrightarrow q \)