1b You won't go skiing, or you will and there won't be any snow.
Let sk represent, "You will go skiing."
Let sn represent, "There will be snow."
Answer: ¬sk ∨(sk∧¬sn)

2b I'll have either fish or chicken, but I won't have both fish and mashed potatoes.
Let c represent the phrase, "I will have chicken"
Let p represent the phrase, "I will have mashed potatoes".
Let f represent the phrase "I will have fish".
Answer (f ∨ c) ∧¬(f ∧ p)

3 a) Alice and Bob are not both in the room.
Let A represent the phrase, "Alice is in the room."
Let B represent the phrase, "Bob is in the room."
Answer: ¬(A∧ B)
b) Alice and Bob are both not in the room.
If Alice is in the room Bob is not and so vice versa.
Let A represent the phrase, "Alice is in the room."
Let B represent the phrase, "Bob is in the room."
¬ A ∧¬ B
c) Either Alice or Bob are not in the room.
Let A represent the phrase, "Alice is in the room."
Let B represent the phrase, "Bob is in the room."
Answer: (¬ A) ∨ (¬ B)
d)Neither Alice or Bob are not in the room.
Let A represent the phrase, "Alice is in the room."
Let B represent the phrase, "Bob is in the room."
Answer: ¬ (A ∨ B)

4 a) $\neg(\neg P \vee \neg\neg R)$
¬¬ R has the same meaning of R by double negation
$\neg P$ by negation rule means not P
$\neg(\neg P \vee \neg\neg R) \equiv \neg(\neg P \vee R)$

This formula is well formed as the meaning still upholds even when the different rules are applied.
b) $\neg(P, Q, \wedge R)$
Based on what we are given, a (,) symbols is not a valid connectives, so therefore, this is not a well formed formula.
c) P ∧¬ P
This is a well formed formula as it has a comparison of a negation and itself.
d) (P ∨ Q)(P ∨R)
Since there is no valid connectives between two statements this is not a valid one as you

cannot multiply statements together.
6a (S $\vee$ G) $\wedge$ ($\neg$ S $\vee\neg G$)

S $\rightarrow$ Steve is happy.
G $\rightarrow$ George is happy.
Since there is an and sign between two reasoning, that means one has to be happy and the other is not happy.
Therefore in the English language: Either Steve or George is happy, and either Steve or George is not happy.