Predicate Logic Questions.

1. What is the correct translation of the following statement into mathematical logic?
   "Some real numbers are rational"

   (A) $\exists x\,(\text{real}(x) \vee \text{rational}(x))$
   (B) $\forall x\,(\text{real}(x) \rightarrow \text{rational}(x))$
   (C) $\exists x\,(\text{real}(x) \wedge \text{rational}(x))$
   (D) $\exists x\,(\text{rational}(x) \rightarrow \text{real}(x))$

2. If anyone cheats, he suffers
   What is the correct translation of the following statement into mathematical logic?

3. What is the logical translation of the following statement?

   "None of my friends are perfect."

   (A) $\exists x(F(x) \wedge \neg P(x))$
   (B) $\exists x(\neg F(x) \wedge P(x))$
   (C) $\exists x(\neg F(x) \wedge \neg P(x))$
   (D) $\neg\exists x(F(x) \wedge P(x))$

4. U = {fleegles, snurds, thingamabobs}
   F(x): x is a fleegle
   S(x): x is a snurd
   T(x): x is a thingamabob
   "No snurd is a thingamabob."

5. Explain the logic with example
   $\forall P(x) \leftrightarrow Q(x)$

6. Write Equivalent logic for the following using only one conjunctive ($\wedge$) expressions or disjunctive ($\vee$) expression :
   $(P \wedge Q) \vee (P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$

7. The following propositional statement is (P → (Q v R)) → ((P ^ Q) → R) is Valid or not?

8. People in a room can be categorized into Truthful and Liars people. A fair coin is placed in front of one of the people in that room without knowing from which category he comes. He is told to toss it, then hide the result from you till you ask for it. In response, the person says: "The result of the toss is Head and I am not telling the Truth."
   What is the result?

9. F1 : P ⇒ ¬ P
   F2 : (P ⇒ ¬ P) ⋁ (¬ P ⇒ P)
   Consider the following two well-formed formulas in prepositional logic. Are they Satisfiable and valid?