First Order Logic: Conversion to CNF

1. Eliminate biconditionals and implications:
   * Eliminate ⇔, replacing *α* ⇔ *β* with (*α* ⇒ *β*) ∧ (*β* ⇒ *α*).
   * Eliminate ⇒, replacing *α* ⇒ *β* with ¬*α* ∨ *β*.
2. Move ¬ inwards:
   * ¬(∀*x p*) ≡∃*x* ¬*p*,
   * ¬(∃*x p*) ≡∀*x* ¬*p*,
   * ¬(*α* ∨ *β*) ≡¬*α* ∧¬*β*,
   * ¬(*α* ∧ *β*) ≡¬*α* ∨¬*β*,
   * ¬¬*α* ≡ *α*.
3. Standardize variables apart by renaming them: each quantifier should use a different variable.
4. Skolemize: each existential variable is replaced by a *Skolem constant* or *Skolem function* of the enclosing universally quantified variables.
   * For instance, ∃*xRich*(*x*) becomes *Rich*(*G*1) where *G*1 is a new Skolem constant.
   * “Everyone has a heart” ∀*x Person*(*x*) ⇒ ∃*y Heart*(*y*) ∧ *Has*(*x,y*) becomes ∀*x Person*(*x*) ⇒ *Heart*(*H*(*x*)) ∧ *Has*(*x,H*(*x*)), where *H* is a new symbol (Skolem function).
5. Drop universal quantifiers
   * For instance, ∀*x Person*(*x*) becomes *Person*(*x*).
6. Distribute ∧ over ∨:
   * (*α* ∧ *β*) ∨ *γ* ≡ (*α* ∨ *γ*) ∧ (*β* ∨ *γ*).

