

**CSE 541 - Logic in Computer Science**  
**Exercises on Resolution**

1. Use resolution and factoring to show that the following set of clauses is unsatisfiable:

$$\neg R(x, y) \vee \neg R(y, x) \\ R(fx, fx)$$

2. Use resolution and factoring to show that the following set of clauses is unsatisfiable:

$$\neg R(x, y) \vee \neg R(y, z) \vee R(x, z) \\ \neg R(fx, fffx) \\ R(x, fx)$$

3. Use a refutational approach via resolution to prove that the formula

$$[(\exists x \forall y P(x, y)) \wedge \forall x (P(x, x) \rightarrow \exists y Q(y, x))] \rightarrow \exists y \exists x Q(x, y)$$

is valid.