Exercise 8 (resolution method)

Using resolution method, decide whether the following arguments are valid

a) **If I am good, I'll get an iPhone.**
   <u>I am be good.</u>
   I get an iPhone.

b) **Who is good gets an iPhone.**
   <u>John is good.</u>
   John gets an iPhone.

c) **He attends a lecture or is wandering around the school.**
   <u>If he attends a lecture, then he is a good student.</u>
   If he is not a good student, then he is wandering around the school

d) **John attends a lecture or is wondering around the school.**
   <u>Who attends a lecture is a good student.</u>
   If John is not a good student, then he is wondering around the school.

e) **If Pavel has a car, then Quido has a car.**
   <u>Pavel does not have a car.</u>
   If Pavel does not have a car, then Quido does not have a car.

f) **It is not true that the student knows Java and C++.**
   <u>The student does not know Java.</u>
   Student does not know C++.

g) **If the program does not work, there is an error in the program or the system is not working properly.**
   If there is an error in the program, I need to consult a trouble-shooter.
   <u>The program is OK.</u>
   If the program does not work, I have to consult the trouble-shooter.

h) **If the engine is not running, there is a fault in the engine or there is no electricity supply.**
   If there is a fault in the engine, a repairman must be called.
   <u>There is an electricity supply.</u>
   If the engine is not running, a repairman must be called.

i) **I watch football and drink beer.**
<u>I do not drink beer.</u>
It is raining outside.

j) **Everybody who is not sick is at work.**
<u>Somebody is not at work.</u>
Somebody is tired or sick.

k) **Everybody who knows Jane and Peter is sorry for Jane.**
<u>Some are not sorry for Jane though they know her.</u>
Somebody knows Jane but not Peter.

a) **No one who is claustrophobic can work as a liftboy.**
<u>All climbers are claustrophobic.</u>
Therefore no climber can work as a liftboy.

Using resolution method prove the following tautologies.

a) $(p \wedge \neg q) \equiv \neg(p \supset q)$

b) $\neg(p \wedge q) \equiv (\neg p \vee \neg q)$

c) $\forall x\, [P(x) \wedge Q(x)] \equiv [\forall x\, P(x) \wedge \forall x\, Q(x)]$

d) $\forall x\, P(x) \vee \forall x\, Q(x) \supset \forall x\, [P(x) \vee Q(x)]$

e) $\exists x\, [P(x) \wedge Q(x)] \supset [\exists x\, P(x) \wedge \exists x\, Q(x)]$

Unify the following literals

a) $P(x, y); \neg P(z, g(t))$

b) $P(f(x), z, g(y, a)); \neg P(y, x, g(f(a), z))$

c) $P(x, b, f(x)); \neg P(a, y, f(y))$

d) $P(x, f(x, z), h(a)); \neg P(y, f(y, y), w)$

e) $P(x, f(y), z); \neg P(f(u), v, f(w))$