Resolution:

Q1. We will be happy. If we will be happy the sun will shine. The sun will shine if and only if either it rains or it will not be cloudy. It will be cloudy but I would not be happy. Convert into proposition.

=> let p= We will be happy

q= the sun will shine

r= it rains

s= it will be cloudy

1)p

2)p→ q

3)q↔(r v ¬s)

4)s ^ ¬p

now,

2) = ¬pvq

3) = ¬qv(r v ¬s),¬(r v ¬s)vq = ¬qvrv¬s,¬r,svq

4) = s,¬p

Finally,

1)p,

2)¬pvq,

3)¬qvrv¬s,

4)¬r,

5)svq,

6)s,

7)¬p

Q2. If it is hot and humid then is=t is raining. If it is humid then it is hot. It is humid. Is it raining?

Let

p = it is hot

q = it is humid

r = it is raining

a) p^q→r

b) q→p

c) q

now

a=> ¬(p^q)vr => (¬pv¬q)vr => ¬pv¬qvr

b=> ¬qvp

c=> q

finally,

a) ¬pv¬qvr

b) ¬qvp

c) q

d) ¬r (added to find if it is raining)

form ‘a’ and ‘b’,

~~¬p~~v¬qvr,¬qv~~p~~ => ¬qvr

so CNF becomes

a)¬qvr

b)q

c)¬r

from ‘a’,’b’

~~¬q~~vr,~~q~~ => r

so CNF becomes

a) r

b) ¬r

from ‘a’,’b’

r,¬r => ɸ

So,it is raining is true.

Q3. Given fact: (b ↔(avc))^¬b. Infer a(is conclusion a).

here,

(b→(avc)^(avc)→b)^¬b

now

a)b→(avc)

b)(avc)→b

c)¬b

again,

a=> ¬bvavc

b=> ¬a^¬cvb

c=> ¬b

again,

a)¬bvavc

b)¬a

c)¬cvb

d)¬b

from ‘a’ and ‘b’

¬bv~~a~~vc,~~¬a~~ => ¬bvc

now CNF becomes,

a) ¬bvc

b) ¬cvb

c) ¬b

from ‘a’ and ‘c’

¬bvc,¬b=> ¬bvc

now CNF becomes,

a) ¬bvc

b) ¬cvb

from ‘a’ and ‘b’

~~¬bvc~~,~~¬cvb~~ => ɸ

So, the given facts infer ‘a’.

Q4. It is raining today. If it is raining today we will go for swimming. We will go to swimming if and only if it will be holiday tomorrow. It will be holiday tomorrow but the course will not be completed on time.

Now infer that if it is not raining today then either we will go for swimming or course will not be completed on time.

Here,

p = it is raining

q = we go swimming

r = holiday tomorrow

s = course will be completed

a) p

b) p→q

c) q ↔ r

d) r^¬s

e) ¬(¬r→(qvs))

now,

a=> p

b=> ¬pvq

c=> (¬qvr)^(¬rvq)

d=> r^¬s

e=> ¬(¬r→(qv¬s)) => ¬(rv(qv¬s)) => ¬r^¬q^s

noe CNF beomes,

~~a) p~~

~~b) ¬pvq~~

~~c) ¬qvr~~

~~d) ¬rvq~~

~~e) r~~

~~f) ¬s~~

~~g) ¬r~~

~~h) ¬q~~

~~I) s~~

so the inferation is true