1.

(1) A’	hypothesis
(2) B’-> (C-> A)	hypothesis
(3) B->A	hypothesis
(4) B’	1,3,mt
(5) C->A	2,4,mp

You can also use the deduction method to prove this problem.

2.

Using the deduction method, we can rewrite the given argument as:

$$[(\forall x)[P(x) \vee Q(x)] \wedge [(\exists x)P(x)]'] \rightarrow (\forall x)Q(x)$$

Consider the following proof sequence:

(i) $[(\exists x)P(x)]'$ hypothesis.

(ii) $P(a)'$ (i), e.i.

(iii) $(\forall x)[P(x) \vee Q(x)]$ hypothesis.

(iv) $P(a) \vee Q(a)$ (iii), u.i.

(v) $P(a)' \vee Q(a)$ (iv), implication.

(vi) $Q(a)$ (ii), (v), Modus Ponens.

(vii) $(\forall x)Q(x)$ u.g.

The last step is justified, since $Q(a)$ was not deduced from a hypothesis in which a is a free variable nor has $Q(a)$ been deduced by existential instantiation from a formula in which a is a free variable.

3.

Use the same proof from Question 8 of Homework 2. The solution is posted in course website.

4.

1. $(\exists x)[W(x) \wedge P(x)]$
2. $(\exists x)[W(x) \wedge P(x)']$
3. $(\forall n)[W(n) \rightarrow (\exists m)[W(m) \wedge G(m, n)]]$
4. $(\exists x)[P(x) \wedge (\forall y)[P(y) \rightarrow G(x, y)]]$