Sample Solutions to Homework Handout #4: Translating from Predicate Logic

Instructions: Use the given interpretations to translate the following arguments written in predicate logic into natural, English sentences.

Ax: "x is an athlete"
Bx: "x is brawny"
Cx: "x is a champion"
m: "Mary"
g: "Gail"
n: "Ned"

1.      1. (x)(Ax ⊃ Bx)                                          1. All athletes are brawny.  Mary and Ned are
        2. Am • An                    / Bm • Bn              athletes.  So, Mary and Ned are brawny.

2.      1. (x)(Ax ⊃ Bx)                                          2. All athletes are brawny.   Everything brawny
        2. (x)(Bx ⊃ Cx)              / (x)(Ax ⊃ Cx)      is a champion.  Therefore, all athletes are
                                                                                champions.

3.      1. (x)(Bx ⊃ Cx)                                          3. Everything that's brawny is a champion.
        2. (∃x)(Ax • Bx)            / (∃x)(Ax • Cx)       There are some brawny athletes.  So, there are
                                                                                some athletic champions.

4.      1. (x)(Ax ⊃ Bx)
        2. ~Bm                         / (∃x)~Ax              4. All athletes are brawny.   Mary isn't brawny.
                                                                                So, something isn't an athlete.

5.      1. (x)[Ax ⊃ (Bx ∨ Cx)]
        2. Ag • ~Bg                  / Cg                       5. All athletes are either brawny or champions.
                                                                                Gail is an athlete, but she isn't brawny.  So, Gail
                                                                                is a champion.

6.      1. (x)[(Ax • Bx) ⊃ Cx]
        2. (∃x)(Bx • ~Cx)          / (∃x)~Ax              6. All brawny athletes are champions.  Some
                                                                                brawny things aren't champions.  So, something
                                                                                isn't an athlete.

7.      1. (∃x)Ax ⊃ (x)(Cx ⊃ Bx)
        2. (∃x)(Ax ∨ Bx)                                       7. If something is an athlete, then all champions
        3. (x)(Bx ⊃ Ax)            / (x)(Cx ⊃ Ax)       are brawny.  Something is either an athlete or
                                                                                brawny.  All brawny things are athletes.  So, all
                                                                                Champions are athletes.