**1. 1.15, p.85**

N1

N

ε

ε

Using and N­1 recognizing produces the following NFAs:

N1

0

q2

q1

1

N

ε

0

q2

q1

1

The NFA N­­1 will accept A1 however N has the same alphabet and is supposed to recognize, but N will also recognize the string 10, which is not in, thus this construction fails to prove closure under the star operation.

**2.**

Since D2 is the complement of D1, D2 will accept any strings in which D1 rejects. So we simply have to switch accept states in D1 to non-accept states and likewise switch non-accept states to accept states and the resulting DFA will be D2. Let and be arbitrary elements of the alphabet.

D1

a

b

a

a

b

D2

a

b

a

a

b

**3.**

ε

0

0

(00)\*

ε

ε

1

1

0

0

(00)\*(11)

ε

(((00)\*(11))

ε

1

1

0

0

ε

ε

1

0

ε

**4. 1.20, p.86**

**b.**

* Members:
  + ababab
  + ab
* Not Members:
  + aaaaaa
  + bbbbb

**h.**

* Members:
  + aa
  + bab
* Not Members:
  + b

**5. 1.21, p.86**

**a.**

ε

a

s

1

b

b

a

a

2

ε

ε

1

s

a

s

a

**6.**

a,b

b

b

a

a

b

b

* b

ε

ε

a

a

3

2

1

s

a

b

b

ε

a

a

2

1

s

s

a