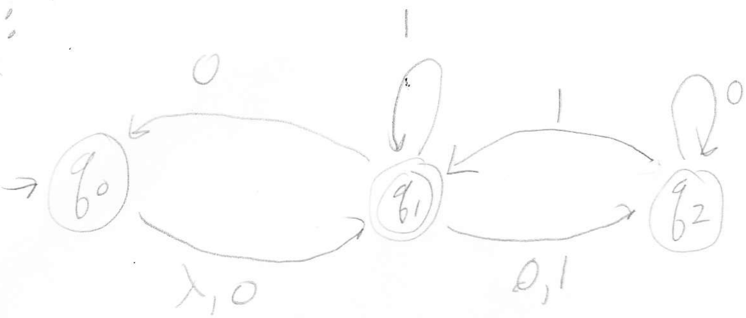
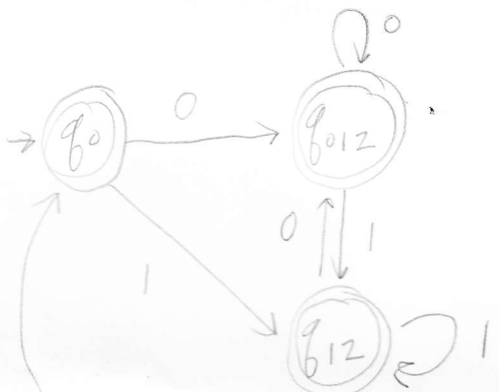
Answer Key #3

Page 62:

3)




NFA

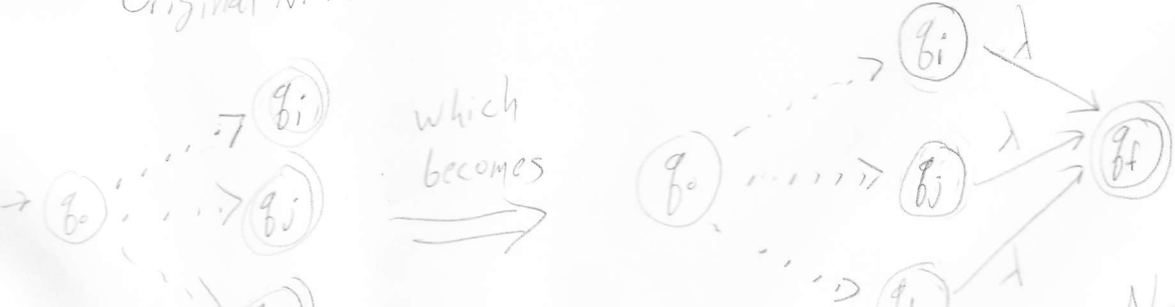



Equivilent DFA

Note $q_0$ must be accepting because the original NFA has a λ transition to an accepting state.

7) solved in text.
Visually it looks like:

Original NFA



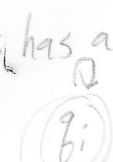

Only accepting state

accepting states

no longer accepting

Note: This works even if $q_0$ is accepting or one of the accepting states has a "loop"

e.g.



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11) Solved in text

Page 75: 1, 4, 16ab

1) find all strings in $L((a+b)^* b(a+ab)^*)$ of length less than 4

recall that $(a+b)^*$ is "anything" including $\lambda$.

$L = \{b, ab, bb, aab, abb, bab, bbb,$
$ba, bab, baa,$
$aba, bba\}$

4) $\{a^n b^m : n \geq 3, m \text{ is even}\}$

$a^n$ $n \geq 3$ can be done w/ 3a's plus some more: $\underbrace{aaa}_{3a's}\underbrace{a^*}_{\text{some more}}$

$b^m$ m is even requires b's to come in pairs: $(bb)^*$

or

$bb(bb)^*$ if zero is <u>not</u> even

So, the answer is:

$aaaa^*bb(bb)^*$

also $a^*(aaa)(bb)^*bb$ or $aa(a^*)ab(bb)^*b$ or...

Page 75 (cont):

16a) $\Sigma = \{a, b, c\}$

all strings containing exactly one a.

Note $(b+c)^*$ is any string of b's & c's (including none)

So, $\boxed{(b+c)^* a (b+c)^*}$

16b) $\Sigma = \{a, b, c\}$

all strings containing no more than 3 a's

Long version: $\underbrace{(b+c)^*}_{\text{no a's OR}} + \underbrace{(b+c)^* a (b+c)^*}_{\text{1 a w/ any \# of b's and c's around it}} + \underbrace{(b+c)^* a (b+c)^* a (b+c)^*}_{\text{2 a's}} + \ldots$

Shorter:

$$(b+c)^* (\lambda + a) (b+c)^* (\lambda + a) (b+c)^* (\lambda + a) (b+c)^*$$