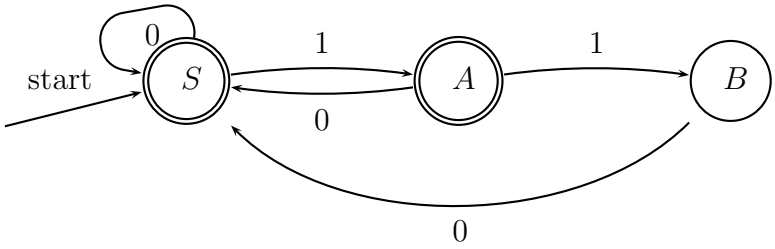
COMP3131/9102: Programming Languages and Compilers

Week 2 Tutorial Solutions

Regular Expressions and NFA

1. (a) $(0|1)^*$
   (b) $\emptyset$
   (c) ϵ
   (d) 011
   (e) 0|011
   (f) $1(0|1)^*$
   (g) $1(0|1)^*0$
   (h) $0^*10^*10^*10^*$
   (i) $1(1|01)^*|\epsilon$

2. (a)

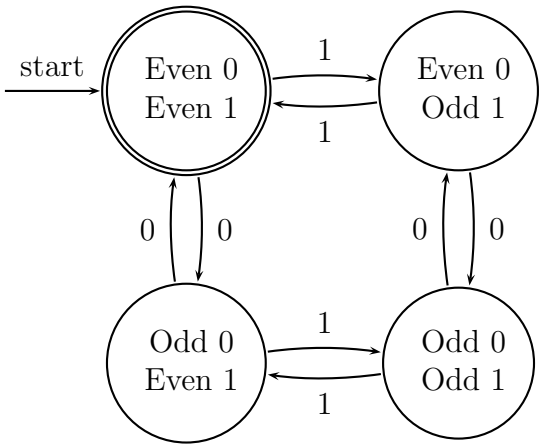


   Descriptions of the states:

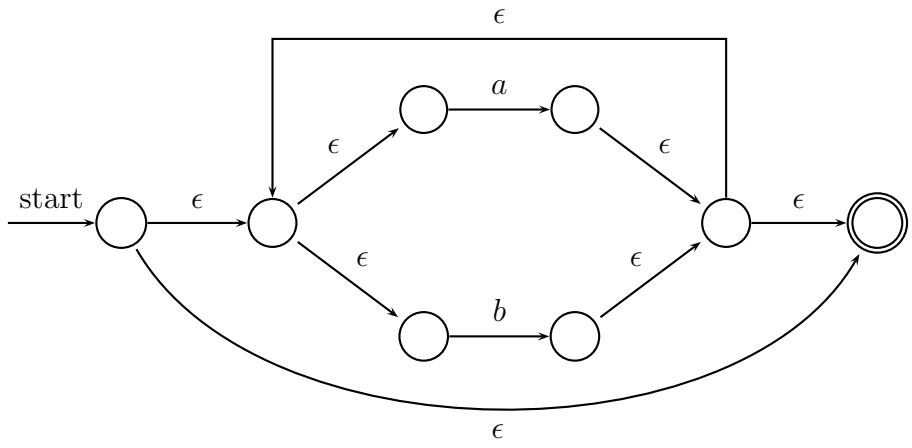
   - S: Every 11 followed by 0 and previous bit $\neq 1$
   - A: Every 11 followed by 0, previous bit $= 1$ but the one before $\neq 1$
   - A: Every 11 followed by 0, previous two bits $= 1$

   starting from 0.

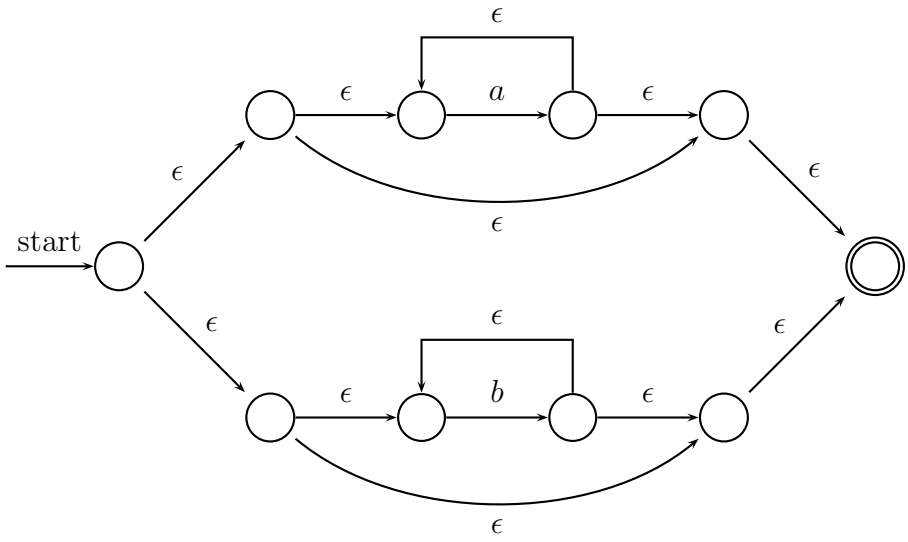
   (b)



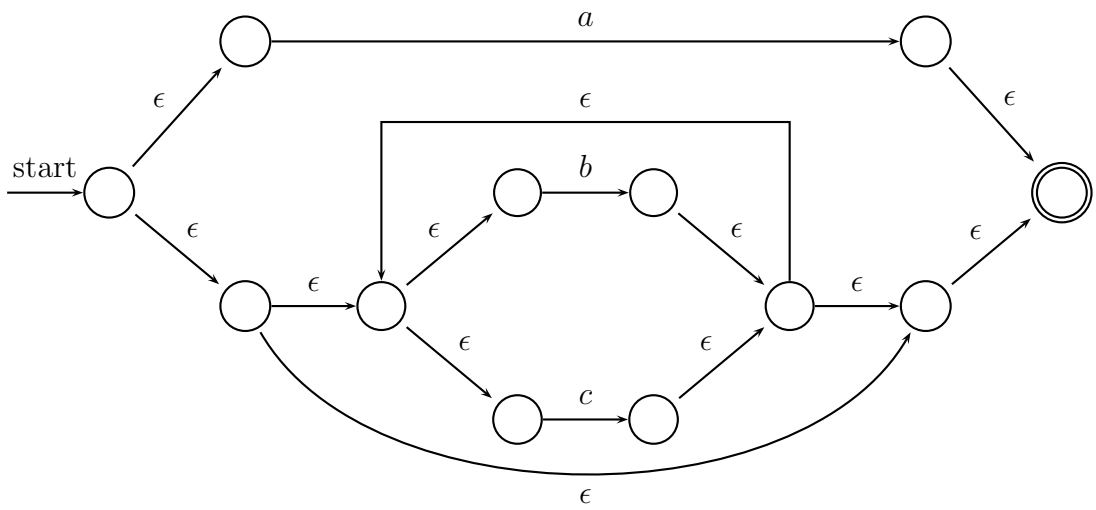
3. (a)



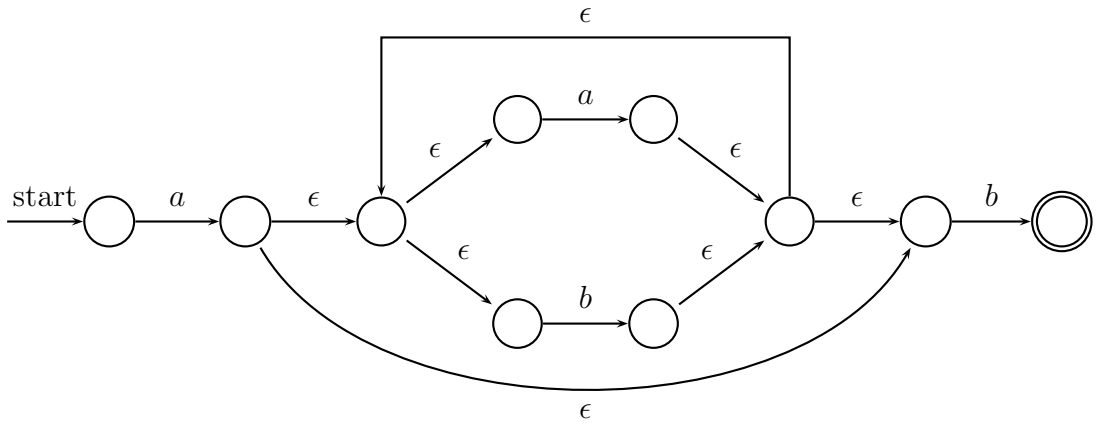
(b)



(c)



(d)



4. (a) `egrep '^y.*y$' /usr/dicts/word`

   (b) The interested student is referred to `http://seders.icheme.org/`

```
#! /bin/sh
#
# Reverse the content of each line.
#

sed '
# add newline as a marker
G
: next
  # move char before marker to end of line
```

```
  s/\(.\)\(\n.*\)$/\2\1/

  # repeat until marker is at beginning
  t next

# remove marker
s/\n//
'
```

(c) The interested student is referred to `http://seasoned-software.com/perl/`

```
#!/usr/bin/perl
#
# replace all occurances of a string in a file to another string
#

if ($#ARGV != 3) {
    print "usage: replstr oldfile newfile oldstring newstring\n";
    exit;
}

$oldfile = $ARGV[0];
$newfile = $ARGV[1];
$old = $ARGV[2];
$new = $ARGV[3];

open(OF, $oldfile);
open(NF, ">$newfile");

# read in each line of the file
while ($line = <OF>) {
    $line =~ s/$old/$new/g;
    print NF $line;
}

close(OF);
close(NF);
```