Department of Computer Science and Engineering
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Compiler Theory: CS31003
3rd year CSE, 5th Semester

Laboratory Quiz - 1 : Flex *Marks: 15*
Date: September 24, 2020

1. Consider the following program and select the correct option: [1]

```
int num_lines = 0, num_chars = 0;
%%
\n  ++num_lines; ++num_chars;
.  ++num_chars;
%%
main()
{
yylex();
printf( "# of lines = %d, # of chars = %d\n",
num_lines, num_chars );
}
```

   a) The rule indicated by the "." regular expression matches any character other than a newline ("$\backslash n$").
   b) The rule indicated by the "." regular expression matches all the characters including new lines ("$\backslash n$").
   c) The rule indicated by the "$\backslash n$" regular expression for character count is incorrect.
   d) The rule indicated by the "." regular expression for character count is incorrect.

   Answer: a)

2. Which of the following options accept the same input patterns in Flex? [1]

   a) `[-+]?([0-9]*\.?[0-9]+|[0-9]+\.)`
   b) `[-+]?([0-9]*\.?[0-9]+|[0-9]+\.[0-9]*)`
   c) `[-+]?[0-9]*\.?[0-9]*`
   d) `[-+]?[0-9]+\.?[0-9]+`

   Answer: a, b

3. What does the following scanner do? [2]

```
%{
int num = 1;
%}
%x c
%%
"/*" BEGIN(c);
<c>[^*\n]*
<c>"*"+[^*/\n]*
<c>\n  ++num;
<c>"*"+"/" BEGIN(INITIAL);
```

a) recognizes "c" and counts number of occurrences of "c".

b) recognizes "c" and counts number of new lines.

c) recognizes and discards "c" and counts number of new lines.

d) recognizes any character other than "c" and counts number of new lines.

Answer: c)

4. Write down the name of the function that flex uses for scanner routine inside the main() of C code. Write the name of the function in lowercase followed by () without any spaces. [1]

   Answer: yylex()

5. Given regular expressions for

```
white space: ws  [ \t]
non-white space:  nonws  [^ \t\n]
word:  word {ws}*{nonws}+
```

select the option that produces correct word counts (wc), line counts (lc) and character counts (cc) respectively. [2]

```
%{
int cc = 0, wc = 0, lc = 0;
%}
ws     [ \t]
nonws  [^ \t\n]
word   {ws}*{nonws}+
%%
```

(a)
```
{word}{ws}+ cc += yyleng; ++wc;
{word}{ws}+\n cc += yyleng; ++wc; ++lc;
{ws}+ cc += yyleng;
\n+        cc += yyleng; lc += yyleng;
```

(b)
```
{word}{ws}+ cc += yyleng; ++wc;
{word}\n        cc += yyleng; ++wc;++lc;
{ws}+ cc += yyleng;
\n+        cc += yyleng; lc += yyleng;
```

(c)
```
{word} cc += yyleng; ++wc;
{word}\n cc += yyleng; ++lc;++wc;
{ws}+ cc += yyleng;
\n+   lc += yyleng;
```

(d)
```
{word}{ws}* cc += yyleng; ++wc;
{word}{ws}*\n cc += yyleng; ++wc; ++lc;
{ws}+ cc += yyleng;
\n+        cc += yyleng; lc += yyleng;
```

Answer : d

6. In the following flex specification the rule with ? expands to: [1]

```
NAME [A-Z][A-Z0-9]*
%%
foo{NAME}? printf("output\n");
%%
```

(a) `[A-Z0-9]*`

(b) `[A-Z][A-Z0-9]*`

(c) `foo{[A-Z][A-Z0-9]*}`

(d) `foo([A-Z][A-Z0-9]*)`

Answer : d)

7. Flex can speed up the process of scanning using: [1]

(a) Adding new rules for matching longer tokens.

(b) Avoiding REJECT option

(c) Concatenating rules with '|' operator

(d) Adding more of '*' operator

Answer : a, b

8. The regular expression 0*[0-9]+ will match the following strings: [1]

a) 1001

b) 111

c) 0012

d) Empty string

Answer : a, b, c

9. How will the input '123.456' be interpreted by the following scanner? [2]

```
%{
#include <math.h>
%}
%s expect
%%
expect-floats  BEGIN(expect);
<expect>[0-9]+.[0-9]+ { printf("float = %f ", atof( yytext ) ); }
<expect>\n {
/* thats the end of the line, so
* we need another "expect-number"
* before well recognize any more
* numbers
*/
BEGIN(INITIAL);
}
[0-9]+ { printf("integer = %d ", atoi( yytext ) ); }
"." printf("dot ");
```

a) integer = 123 dot

b) integer = 123 dot integer = 456

c) float = 123.456

d) float = 123.456 integer = 123 dot

Answer : b)

10. The regular expression "0/1" matches [1]

a) 0 in the string 01

b) 0 in the string 02

c) 0 in the string 011

d) 0 in the string 001

Answer: a, c

11. Fill in the blanks [1]

A start condition is activated using the _____ action.

Answer : BEGIN

12. Write Flex specification (only the Regular Definitions) for Octal constants. Assume that an Octal constant starts with the lowercase letter "o". Type your answer without any spaces.

Answer : o[01234567]+ or o[0-7]+ [1]