

# Subject: Programming Language and Compiler Design Lab Assignment

## Lab Assignment Week 3 : Compiler Design - Lexical Analysis

**Common Instruction : Write code in any programming language, NO BUILT IN functions/classes for given job shall be used**

Q 1. Write a function named `is_integer()` which inputs a string (may contain any ascii character) and returns `true(1)` if input string is a valid integer, otherwise `false(0)`.

Example :

(i) I/P "23"	O/P 1	(ii) I/P "-23"	O/P 1
(iii) I/P "2a3"	O/P 0	(iv) I/P "2.3"	O/P 0

Q 2. Write a function named `is_float()` which inputs a string (may contain any ascii character) and returns `true(1)` if input string is a valid floating point number, otherwise `false(0)`.

Example :

(i) I/P "2.3"	O/P 1	(ii) I/P "-2.3"	O/P 1
(iii) I/P "23"	O/P 0	(iv) I/P "-23"	O/P 0
(v) I/P "0.23"	O/P 1	(vi) I/P "-0.23"	O/P 1
(vii) I/P "0.2.3"	O/P 0	(viii) I/P "2..3"	O/P 0
(ix) I/P ".23"	O/P 1	(x) I/P "23."	O/P 1

Q3. Write a function named `chk_ipaddress()` which inputs a string (may contain any ascii character) and checks if the given string is a valid IP address or not, and output type of IP address, i.e. (IPv4/IPv6/Invalid-IP)

Note: Take care of IPv4 and IPv6, including collapsed/compressed format also

(i)	I/P	123.234.43.2	O/P	IPv4
(ii)	I/P	123.234.43.2.4.3	O/P	Invalid
(iii)	I/P	2002:4559:1FE2:0000:0000:0000:4559:1FE2	O/P	IPv6
(iv)	I/P	2002:4559:1FE2:0:0:0:4559:1FE2	O/P	IPv6
(v)	I/P	2002:4559:1FE2::4559:1FE2	O/P	IPv6
(vi)	I/P	2002:4559:1FE2::4559:1F <del>x</del> 2	O/P	IPv6
(vii)	I/P	123.284.43.2	O/P	IPv4

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Q4. Write a function to count and display all the keywords in a given C statement in the form of a string.

Example :

- |                                       |                |
|---------------------------------------|----------------|
| (i) I/P "int a=5;"                    | O/P int        |
| (ii) I/P "int floatt=6;"              | O/P int        |
| (iii) I/P "for(i=1;i<5;i++);"         | O/P for        |
| (iv) I/P "printf("int l = %d",i);"    | O/P NO-KEYWORD |
| (v) I/P "float t[4]; while(While=8);" | O/P while      |

Q5. Write a function to segregate all valid identifiers from a given string containing a C statement.

Example :

- |  |              |
|--|--------------|
| (i) I/P "int a = 5;"                     | O/P a        |
| (ii) I/P "int floatt=6;"                 | O/P floatt   |
| (iii) I/P "for(i=1;k2<5;i++);"           | O/P l, k2    |
| (iv) I/P "printf("int l = %d",count67);" | O/P count67  |
| (v) I/P "float t[4]; while(While=8);"    | O/P t, While |

Q6. Write a function named is\_email() which inputs a string (may contain any ascii character) and returns true(1) if input string is a valid email-id, otherwise false(0).

Note: Confirm rules from authenticated document and mention the same in comments.

Followings are test cases obtained by

<http://blogs.msdn.com/b/testing123/archive/2009/02/05/email-address-test-cases.aspx>

Valid Email address	Reason
email@domain.com	Valid email
firstname.lastname@domain.com	Email contains dot in the address field
email@subdomain.domain.com	Email contains dot with subdomain
firstname+lastname@domain.com	Plus sign is considered valid character
email@123.123.123.123	Domain is valid IP address
email@[123.123.123.123]	Square bracket around IP address is considered valid
"email"@domain.com	Quotes around email is considered valid
1234567890@domain.com	Digits in address are valid
email@domain-one.com	Dash in domain name is valid
____@domain.com	Underscore in the address field is valid
email@domain.name	.name is valid Top Level Domain name
email@domain.co.jp	Dot in Top Level Domain name also considered valid (use co.jp as example here)
firstname-lastname@domain.com	Dash in address field is valid

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Invalid Email address	Reason
Plainaddress	Missing @ sign and domain
#@%^%#\$@#\$\$@#.com	Garbage
@domain.com	Missing username
Joe Smith <email@domain.com>	Encoded html within email is invalid
email.domain.com	Missing @
email@domain@domain.com	Two @ sign
.email@domain.com	Leading dot in address is not allowed
email.@domain.com	Trailing dot in address is not allowed
email..email@domain.com	Multiple dots
あいうえお@domain.com	Unicode char as address
email@domain.com (Joe Smith)	Text followed email is not allowed
email@domain	Missing top level domain (.com/.net/.org/etc)
email@-domain.com	Leading dash in front of domain is invalid
email@domain.web	.web is not a valid top level domain
email@111.222.333.44444	Invalid IP format
email@domain..com	Multiple dot in the domain portion is invalid