

CST8234 – C Programming Sample Questions Midterm II

Name: _____

Section I

[35 Points]

Write a small C-like function **revstr()** that reverses a string **s** in the same string.

Function Prototype:

```
void revstr( char * s );
```

Example:

Memory Position	String
s [0x7fffc22b8550] -->	Hello World
s [0x7fffc22b8550] -->	dlroW olleH

`int strlen(char * s)` from the library `string.h` returns to you the length of the string **s**.

To obtain all the points in this question, you need to use the same function prototype given above.

[10 Points]

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Sample Questions Midterm II

Write a small C-like function **reverseFile()** that reverses each line of a file, and writes the new file into a new file. Your function should return 0 if it was able to reverse the file or **EXIT_FAILURE** if it encountered any problems.

Function Prototype:

```
int reverseFile( char * filein, char *fileout );
```

Pre-Conditions:

filein: It is an existing file
fileout: A file may exist or not

Post-Conditions:

filein: It is an existing file
fileout: It is a duplicate of filein, but each line is has been reversed. Filein and fileout have the same size. The function returns 0 if it was able to reverse the file or EXIT_FAILURE if not

Example:

```
root@luna:/13W_CST8234# more  
test  
This is simple example  
of how to reverse a complete  
line in a file
```

```
root@luna:/13W_CST8234# more  
output  
elpmaxe elpmis si sihT  
etelpmoc a esrever ot woh fo  
elif a ni enil
```

[10 Points]

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Assume you have a function `display_usage()` in a file `usage.c` with the following function prototype in the file `usage.h`:

```
/******  
 * displays in stderr a usage message for a program prog that needs  
 * arguments arg  
******/  
void display_usage( const char *prog, const char *arg );
```

You **DO NOT** need to write this function.

Write a complete program that receives from the command line argument two arguments `filea`, `fileb`. Your program should check that the correct number of arguments are passed and display the appropriate usage message if not. If you have the right number of arguments, your program should reverse `filea` into `fileb`.

[5 Points]

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Assuming that you wrote your `main()` function and your `reverseFile()` and your `revstr()` in a file called `main.c`, and that you use the `display_usage()` function from the file `usage.c`, how would you manually compile your program to create an executable called `reverse`. You want your code to be ANSI C.

[4 Points]

Jared finished to write his program and his Makefile. After giving the `make` command, he got the following error:

```
root@luna:/13W_CST8234# make
tmp/ccU7gSMg.o: In function `reverseFile':
ReverseFile.c:(.text+0x195): undefined reference to `revsr'
collect2: ld returned 1 exit status
```

Please notice that some information has been omitted in the above `make` command.

- a) What does the error means,
- (b) from which stage of the compilation process is coming and
- (c) what can you do to fix it.

[6 Points]

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Section II

[8 Points]

Given the following data structure and variable definitions:

```
struct Point3D {  
    float x, y, z;  
};  
  
struct Point3D vertex;  
struct Point3D *p;
```

Initialize **vertex** with the values, 10.5, 10.5, 10.5 and **p** with the values -10.5, -10.5, -10.5 [4 Points]

What would be the output of the following code, explain your answer

[4 Points]

```
sizeof( vertex );  
sizeof( p );
```

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Section II

[20 Points]

Giving the following data structure:

```
struct node {  
    int data;  
    struct node * next;  
}
```

Write a small C-like function `insertN()` which will insert a new node at any index within a list. The caller may specify any index in the range `[0..n]`, and the new node should be inserted so as to be at that index.

Function prototype:

```
void insertN(struct node** headRef, int index, int data);
```

Example

```
root@luna:/13W_CST8234# ./insertN  
[ HEAD ]-->[ 0 ]-->[ 15 ]-->[ 10 ]-->[ 5 ]-->[ NULL ]  
insertN( &head, 3, -44 )  
[ HEAD ]-->[ 0 ]-->[ 15 ]-->[ 10 ]-->[ -44 ]-->[ 5 ]-->[ NULL ]  
insertN( &head, 40, -55 )  
[ HEAD ]-->[ 0 ]-->[ 15 ]-->[ 10 ]-->[ -44 ]-->[ 5 ]-->[ NULL ]  
insertN( &head, 0, -66 )  
[ HEAD ]-->[ -66 ]-->[ 0 ]-->[ 15 ]-->[ 10 ]-->[ -44 ]-->[ 5 ]-->[ NULL ]
```

Be sure to carefully test your boundary conditions.

[10 Points]

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Sample Questions Midterm II

Write a small C-like function `removeN()` which will removes a node at any index within a list. The caller may specify any index in the range `[0..n]`, and the node should be removed.

Function prototype:

```
void removeN(struct node** headRef, int index);
```

Example:

```
[ HEAD ]-->[ -66 ]-->[ 0 ]-->[ 15 ]-->[ 10 ]-->[ -44 ]-->[ 5 ]-->[ NULL ]
removeN( &head, 2 )
[ HEAD ]-->[ -66 ]-->[ 0 ]-->[ 10 ]-->[ -44 ]-->[ 5 ]-->[ NULL ]
removeN( &head, 3 )
[ HEAD ]-->[ -66 ]-->[ 0 ]-->[ 10 ]-->[ 5 ]-->[ NULL ]
removeN( &head, 30 )
[ HEAD ]-->[ -66 ]-->[ 0 ]-->[ 10 ]-->[ 5 ]-->[ NULL ]
removeN( &head, 0 )
[ HEAD ]-->[ 0 ]-->[ 10 ]-->[ 5 ]-->[ NULL ]
```

Be sure to carefully test your boundary conditions.

[10 Points]