CS 225	Data Structures and Problem Solving	Test 1
Name:		Maximum Points: 52

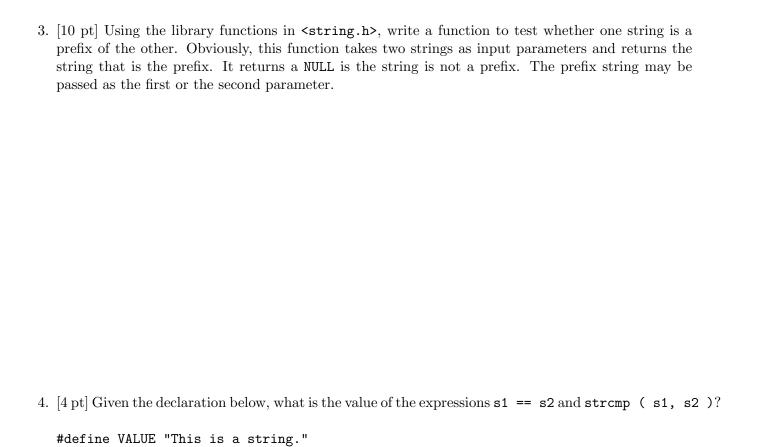
Important: This is an open book test. You can use any books, notes, or paper. *Do not log into the computer during the test*. Any calculations and rough work can be done on the back side of the test pages. If there is a syntax error in any program segment, just write it down and you will get full credit for the problem.

1. [4 pt] What is the value of str[strlen(str)] for any string?

2. [4 pt] In a certain C book, I found the following statement to illustrate the use of an empty string.

```
printf ( "You have %d egg%s", num_eggs == 1 ? "" : "s" );
```

What is the purpose of this statement? Does it achieve that purpose? How (if true) or why not (if false)?



char *s1 = VALUE;
char *s2 = VALUE;

5. [10 pt] The code fragment below allocates memory for a pointer and then stores the address of another memory block in the first one. How many calls to **free** will be required to return all the memory to the heap, one or two?

```
char **p;
p = ( char ** ) malloc ( sizeof ( char * ) );
*p = ( char * ) malloc ( 100 );
```

6. [10 pt] Using suffix rules, write a makefile definition to compile a target named my_math from the files main.c, square.c, sqrt.c, and cube.c. You will need the mathematics library at the time of linkage. Also, I need the code to be optimized and you should use the appropriate compiler flag for the purpose. Finally, I am using a header file funcs.h that contains prototype definitions and some constants. I want the make utility to recompile erveything when the header file is modified.

[10 I	ot] Write statements that accomplish each of the following.
(a)	Create a structure named person with fifteen characters for the last name, fifteeen characters for the first name, and a short integer for age. Create a type person_type using the above structure and the typedfe statement.
(b)	Open a file called persons.dat in which you can write the variables of the type declared above.
(c)	Initialize the above file so that there are 100 records with the last name as unassigned (put this string in the file), first name as blank (NULL), and age as 0.
(d)	Assign to the fifth record the last name Clinton, first name Bill, and age as 50.
(e)	Write the fifth record into the file. (Don't write other records).