

CSI 2172
Assignment 2
Due Date: 25 June 2004

Question 1

A three-dimensional (3D) vector, $v=(x,y,z)$, consists of three real number components, x , y and z . Typical mathematical operations include the following. (here, $v1=(x1,y1,z1)$ and $v2=(x2,y2,z2)$ are 3-dimensional vectors and a is a real number).

$v1+v2$;
 $v1-v2$;
 $a*v1=v1*a$;
 $v1*v2$ (dot product);
magnitude: $|v1| = \text{squareroot}(x1*x1+y1*y1,z1*z1)$;

- a. Implement the above mathematical operations on the 3Dvector class.
- b. Overload the subscript operator `[]` so that components of the vector can be accessed in the same way as ordinary array element syntax.

Question 2

A date object is defined by its 3 integer components day, month and year. (e.g date of the midterm is `date(27,2,2004)` for 27-Feb-2004). Some of the behaviour of this date object include: Initialize itself as a particular date, tell what its day, what its month, what its year, advance to the next date.

- a. Write definitions of the member functions which implement the above object behaviour. If the year is not in the initialization then the current year is assumed (e.g. `date(28,3)` is a valid date which represents 28-Mar-2004).
- b. Write definitions for the overloaded comparison and equality operators, `<`, `>`, `<=`, `>=`, `==`, and `!=`.
- c. Write definitions of the overloaded input and output operators `<<` and `>>`.
- d. Overload the addition operator `+` in order to be able to add an integer to a date which yields another date object. (e.g. `date(27,2, 2004)+4 = date(2,3, 2004)`)

a `main()` function must be written in order to test your version of the date class with its overloaded operators and member functions.

Question 3

Implement the following functions in C++ using pointers:

a. void sort (char * s, char * d)

which reads a string of characters **s** and returns the sorted string in **d**. The **d** string is sorted in increasing order.

(Example: if **s** = "ba0c" then **d** = "0abc")

b. int strcmp(char *s1, char *s2)

which compares two strings s1 and s2 and returns:

-1 if s1 < s2
0 if s1==s2
+1 if s1 > s2.

c. bool palindrome (char *s)

which reads a word **s** and returns TRUE if the word **s** is palindrome and FALSE otherwise.

A palindrome is a word that is spelled exactly the same when the letters are reversed.
(Example: "ajja" is palindrome).

Question 4

Write a Function which forms the plurals of English nouns according to the following rules:

if the noun ends in "y", remove the "y" and add "ies" ;
if the noun ends in "s", "ch", or "sh", add "es" ;
otherwise, just add "s" .