

CprE 185 Exam 2 Fall 2015

First Name: _____

Last Name: _____

Score: _____

Problem 0: What kind of numbers were involved in computing the fractal that we did in lecture? (5pts)

How did we speed up the word counting program? (Algorithm name or brief description) (5pts)

What board game did we use 2-d arrays to set up in our lecture program? (5pts)

Problem 1 (20 pts)

Fill in the provided function below to compute and return the "diminish" measure of the array values which has length elements in it. The diminish measure is computed by summing the elements where each is divided by an increasing term. These terms are the squares of the integers. Example: diminish of (1,2,3,1) would be $1.0/(1^2) + 2.0/(2^2) + 3.0/(3^2) + 1.0/(4^2) = 5.0625$. If norm is false, then return the diminish measure. If it's true, return the same value divided by the length.

```
double diminish(double values[], int length, int norm) {
```

```
}
```

Problem 2 (20 pts)

The dot product is computed by taking 2 equal length arrays, multiplying their respective elements and adding the result. e.g. dot product of (1,2,3) and (-1, -1, 0) = $1*-1 + 2*-1 + 3*0 = -3$

Given here is an incorrect implementation of dot product.

```
double dot(double a[], double b[], int len)
{
    int i;
    double sum; // line A
    for (i = len; i > 1 ; i--) // line B
    {
        sum = (a[i] * b[i]); // line C
    }
    return sum;
}
```

As written above, what does dot return if a[] contains 2, 4, 5 and b[] contains -2, -9, 3 and len is 3?
You may assume that uninitialized variables or out of bound values contain -1. (5pts)

Below, correct each of line A, B, and C so that dot operates properly. (5pts per line)

LINE A

LINE B

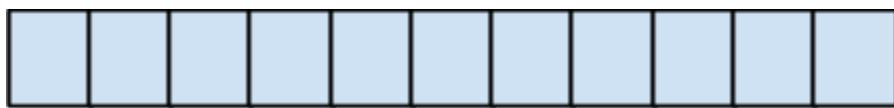
LINE C

Problem 3 Strings

After the code below, **complete the diagrams of a and b below showing all of their elements and their contents in memory**. If you don't have a way of knowing an element's contents, put a '?' above the element. Show their contents as they appear after the following code runs.

```
char a[11] = "ONBART";
char b[11] = "TWON";
char *c = &(a[4]);
strcat(a, "ADD"); // Appends second argument to first
strcpy(b, c); // copies second argument to first
char *d = &(b[3]);
```

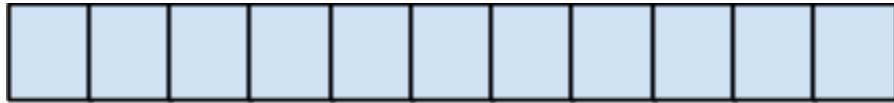
a



0 1 2 3 4 5 6 7 8 9 10

(7pts)

b



0 1 2 3 4 5 6 7 8 9 10

(7pts)

Show how c and d relate to a and b. (4 pts)

What would printf("%s,%s", c, d) display? (2pts)

Problem 4a. What does the code below output? (10 pts)

```
void f(int x);

int main() {
    int x = -999;
    printf("3: %d\n", x);
    f(x);
    printf("4: %d\n", x);
}

void f(int x) {
    printf("1: %d\n", x);
    x = 5;
    printf("2: %d\n", x);
}
```

4b. Write a function called fib that modifies its two integer output parameters as follows: the first becomes two times the first minus the second. The second becomes the first argument. (10 pts)

Example of using your function:

```
int a=4; int b=1;
fib(&a, &b);
printf("%d, %d\n", a, b); // Outputs 7, 4
fib(&a, &b);
printf("%d, %d\n", a, b); // Outputs 10, 7
fib(&a, &b);
printf("%d, %d\n", a, b); // Outputs 13, 10
```

Problem 5. The game of go is played on a 19 by 19 square grid where players can place either a black or white stone or it can be left blank.

```
char goBoard[19][19]; // Go Board
```

Each element of the board is either blank, represented by a space, a 'b', or a 'w' to indicate the pieces placed.

Complete the function named status shown below such that it returns the integer number of blank spaces on the board. It should use pass by pointer (pass by reference) to indicate the percentage of the board that is black and the percentage of the board that is white.

```
_____ status(char bd[19][19], _____ pctWhite, _____ pctBlack) {
```