ES 112 Second Midterm Examination
-B-
Fall 2003-2004

1 Recursive Function

(30 Points)

The function $g(n)$, where n is a nonnegative integer, is defined to as:

$$\begin{aligned} g(0) &= 1 \\ g(1) &= 2 \\ g(n) &= g(n-1) \cdot g(n-2) + 1, \quad n \geq 2 \end{aligned}$$

Write a C function that takes the number n as its argument, and calculates and returns $g(n)$ as an integer. If $n < 0$, the function should return -1. The prototype is:

```
int g(int n);
```

2 A String Function

(35 Points)

Implement the following (standard C string library) function:

```
char *strrchr(const char *s, int c);
```

The `strrchr()` function returns a pointer to the last occurrence of the character `c` in the string `s`. If the character is not found, a NULL pointer is returned.

3 The Geometric Mean

(35 Points)

The geometric mean of n numbers $x_1, x_2, \ldots, x_n$, G, is defined by the following equation:

$$G = \sqrt[n]{x_1 \cdot x_2 \cdot \ldots \cdot x_n}$$

Write a function that takes two arguments: a pointer to the beginning of an array of `double`s, and the number of elements in the array; and returns the geometric mean of the numbers in the array. You may assume that all numbers in the array are positive. The prototype of the function should be:

```
double geometricMean (double *numbers, int n);
```