ES 112 First Midterm Examination
Spring 2003-2004

1 Figure Skating Points

40 points

In figure skating tournaments, each contestant receives a score from each judge. Then, the average score of the contestant is calculated by taking all scores, ignoring the highest and the lowest score, and averaging the remaining scores.

Assume that in a figure skating tournament there are six judges. Write a C program that will input the six scores from the judges (which are floating point numbers, like 5.8) and will compute and print out the average, ignoring the highest and lowest scores.

2 Calculating Logarithms

40 points

Your task in this question is to write a function that calculates the natural logarithm of a number. The natural logarithm of a number is given by the following infinite series:

$$\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \cdots$$

Of course, for computation purposes, you need:

$$\ln(x) = (x-1) - \frac{(x-1)^2}{2} + \frac{(x-1)^3}{3} - \frac{(x-1)^4}{4} + \cdots$$

The prototype of the function should be:

```
double log(double x, int n);
```

where x is the number for which we wish to compute the logarithm, and n is the number of terms from the infinite series to be included in the calculation.

3 Multiply by Seven

20 points

Write a C function that takes an integer as an argument, and returns seven times that number as an integer. In other words, the prototype is:

```
int multiply_by_seven(int n);
```

This looks really easy, but there are constraints! You are not allowed to use the multiplication operator. You are not allowed to use the addition operator, either! In addition, you are not allowed to use any loops You are, however, allowed to use bit shifting operators.