Computer Programming: Skills and Concepts
Tutorial 5 (Tue 1 Nov – Fri 4 Nov)

Arrays
What is the value of the array a at the indicated point?

```c
void Rev(int a[], int b[], int n) {
    int i;
    for (i=0; i < n; i++) { b[n-1-i] = a[i]; }
}

int main(void) {
    int a[4] = { 0, 1, 2, 3 };  
    int b[4];
    Rev(a,b,4);
    Rev(b,a,3);
    /* what is the value of a here? */
}
```

Another function
We would like to have a function that takes \( n = 3 \) three numbers \( a_i \) and gives us the average \( \mu \) and the variance \( \sigma^2 \)

\[
\mu = \frac{1}{n} \sum_{i=1}^{n} a_i \\
\sigma^2 = \frac{1}{n} \sum_{i=1}^{n} (a_i - \mu)^2
\]

How can we write a function that returns two values?

I/O with characters
Consider the following code:

```c
#include <stdio.h>
int main(void) {
    int c;
    while ((c = getchar()) != EOF) {
        printf("char %c, ASCII code %d\n", c, c);
    }
}
```

What gets printed on the screen for the following input: 0123 abc ABC
Programming

In lectures 10–11 we wrote a program to print numbers in different bases. Here is (a slightly shortened version of) the finished program (available as base.c from the course page):

```c
#include <stdlib.h>
#include <stdio.h>

void PrintDigit(int d) {
  printf("<%d>",d);
}

int main(void) {
  int n,b;
  printf("Please give me n and b: ");
  scanf("%d %d",&n,&b);

  if ( n < 0 ) { printf("-"); n = n*-1; }
  int bp;
  bp = 1;
  while ( bp*b <= n ) { bp = b*bp; }
  int digit;
  while ( bp > 0 ) {
    digit = n/bp;
    PrintDigit(digit);
    n = n % bp;
    bp = bp/b;
  }
  printf("\n");
  return EXIT_SUCCESS;
}
```

How can we extend the program so that the number n is a floating point number. Assume that the representation should be printed to exactly PRECISION places after the ‘decimal’ point. For example, with PRECISION == 6, decimal 6.25 should be printed in base 4 as 12.100000, and decimal 1.5 should be printed in base 3 as 1.111111. **Note:** you can get the integer part of a non-negative floating point number by casting it to int (as long as the number isn’t too big to be an int).

(Optional) Work out how to avoid printing a string of trailing zeros, so that 6.25 in base 4 is printed as 12.1.

After discussing this in the tutorial, implement the solution in your own time.