```
    Help
#include <stdio.h>
#include <stdlib.h>
#include <math.h>
#include "pnl/pnl_mathtools.h"

#define NRANSI
#define SWAP(a,b) temp=(a);(a)=(b);(b)=temp;
#define NSTACK 50

static int istack[NSTACK];

/* Sort function only used by the Marraquand Martineau alg
    orithm for american
   options.

   bs1d, bs2d, bsnd
*/
void Sort(unsigned long n, double *arr)
{
  unsigned long i,ir=n,j,k,l=1;
  int jstack=0;
  int M=7;
  double a,temp;

  for (;;) {
    if (ir-l < M) {
      for (j=l+1;j<=ir;j++) {
        a=arr[j];
        for (i=j-1;i>=1;i--) {
          if (arr[i] <= a) break;
          arr[i+1]=arr[i];
        }
        arr[i+1]=a;
      }
      if (jstack == 0) break;
      ir=istack[jstack--];
      l=istack[jstack--];
    }
    else {
      k=(l+ir) >> 1;
```

```
    SWAP(arr[k],arr[l+1])
      if (arr[l+1] > arr[ir]) {
        SWAP(arr[l+1],arr[ir])
          }
    if (arr[l] > arr[ir]) {
      SWAP(arr[l],arr[ir])
        }
    if (arr[l+1] > arr[l]) {
      SWAP(arr[l+1],arr[l])
        }
    i=l+1;
    j=ir;
    a=arr[l];
    for (;;) {
      do i++; while (arr[i] < a);
      do j--; while (arr[j] > a);
      if (j < i) break;
      SWAP(arr[i],arr[j]);
    }
    arr[l]=arr[j];
    arr[j]=a;
    jstack += 2;
    if (jstack > NSTACK){
      printf("SORTING ERROR{n");
      exit(0);
    };
    if (ir-i+1 >= j-l) {
      istack[jstack]=ir;
      istack[jstack-1]=i;
      ir=j-1;
    }
    else {
      istack[jstack]=j-1;
      istack[jstack-1]=l;
      l=i;
    }
  }
 }

}
#undef NSTACK
```

```
#undef SWAP
#undef NRANSI
```

References