ENGG*1410: "Introductory Programming for Engineers", Assignment #6 Functions

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Start Date: Week #6, Due Date: Week #7 (Friday, 5:00 PM) in Dropbox

1. Write a function that raises an integer to a positive integer power. Call the function x_to_the_n() taking two integer arguments x and n. Have the function return a long int, which represents the results of calculating x^n. Also, write a main() routine to test the function.

2. Write a function called arraySum() that takes two arguments: an integer array and the number of elements in the array. Have the function return as its result the sum of the elements in the array. Also, write a main() routine to test the function.

3. A Matrix M with *i rows, j columns can be transposed into a Matrix N have j rows and i columns by simply setting the value of* $N_{a,b}$ *equal to the value of* $M_{b,a}$ *for all relevant values of a and b.*

   (a) Write a function called transposeMatrix() that takes as an argument a 4x5 matrix and a 5x4 matrix. Have the function transpose the 4x5 matrix and store the results in the 5x4 matrix. Also write a main() routine to test the function.

   (b) Using variable-length arrays, rewrite the transposeMatrix() function developed in the previous step to take the number of rows and columns as arguments, and to transpose the matrix of the specified dimensions.

4. *The following code sorts an Array of integers into ascending order.*

   - *Compile and run the program. Verify that it indeed sorts the values.*
   - *Modify the sort function to take a third argument indicating whether the array is to be sorted in ascending or descending order. Then modify the sort() algorithm to correctly sort the array into the indicated order.*

```
#include<stdio.h>

// Function Declaration
void sort (int a[], int n);

void sort (int a[], int n)
{
   int i, j, temp;

   for (i = 0; i < n; ++i)
```

```
   {
      for (j = i+1; j < n; ++j)
      {
         if ( a[i] > a[j])
 {
    temp = a[i];
    a[i] = a[j];
    a[j] = temp;
         }
      }
  }
}

int main (void)
{

  int i;
  int array[16] = {34, -5, 6, 0, 12, 100, 56, 22,
                   44, -3, -9, 12, 17, 22, 6, 11};

  printf("The array before the sort:\n");
  for (i=0; i < 16; i++)
     printf("%i ",array[i]);

  // call the sorting algorithm function
  sort(array, 16);

  printf("\n");
  printf("The array after the sort:\n");
  for (i=0; i < 16; i++)
     printf("%i ",array[i]);

  printf("\n");
  return 0;
}
```