COMP281 Assignment 2

1029 – ROT R 3

inputVar is created and malloc'd to allow 1000 characters (as no maximum length was defined). Fgets obtains the input. So long as the program is not at the end of the input, an integer stores the ASCII value of the current character. Using ASCII ranges for lowercase and uppercase letters, if statements are made – one for the ranges of a-w and A-W, as well as a second if statement for x-z and X-Z. the current character is modified by 3 or -23 respectively. Fputs is used to output the string.

1032 – String Search

Three character pointers are malloc'd to the max. string length, which is 1000 (although no length was defined in the question). Fgets obtains each input. A while loop runs through the length of the first string ('a') and an isExact function is called – using 'a' and 'b', then 'a' and 'c'. This function uses a for loop with the length of the second variable's length ('b' or 'c') which checks if the current character in 'a' is not the same as the current character in the second variable. If the two characters are not exact, an int variable is used as a binary flag and the loop is broken, returning the 'false flag.' When the if statement is never found to be true, the 'exact' int variable is returned as 0 – indicating 'true.' Whenever true, the if statements in 'main' increment the corresponding counter. bCount and cCount are then outputted to console.

1041 – Dot Product of Two Matrices

Three int inputs are given. Three double int pointer matrices are created using the input (n * m, m * p, n * p). The occMatrix function is called for both matrix1 and matrix2. This uses a double for loop to obtain the correct position in the matrix then simply uses scanf for input. Once complete, three for loops are made, in the order of n, p, m. The output matrix at position [n, p] becomes equal to itself plus matrix 1 at position [n, m] and matrix 2 at position [m, p]. A for loop is used with printf to output all elements in the output matrix.

1043 – Sort Strings

Taking an int input, a double character pointer is created with the int's value being the number of character pointers stored, and 100 being the size of the memory allocated. The getInput function is then called with the matrix as a variable. getInput is simply a for loop with an embedded scanf command. Once the second int input is provided, a second double character pointer variable is created, with the first matrix's information being copied into the second with strcpy(). The first matrix is then de-allocated as it is no longer needed. getInput is then called with the second (now only) character matrix, using the first int input as the changing variable in the for loop. srtInput uses the bubble sort algorithm to sort all inputs within the matrix based on length – pointers are moved around, not the actual data. Once sorted, recMatrix changes any newline characters within the matrix into EOF characters, and the strings are reallocated to the required size. The outInput function is called, which uses a for loop to print to console and free() the memory.

1044 – 2^x

As the maximum requirement was 2^10000, which is 1.9 x 10^3010, I created an int array with 3020 elements – which uses a defined variable. First an integer input is obtained. A function is called to set all elements in the array to 0 and then the final element as 1. A double for loop is used; the first running the int input number of times, and the second to traverse through the int array backwards. A temporary variable stores the current element multiplied by 2 then adds the value of a remainder variable. The current element then has it's value changed to the temp variable modulus 10, to obtain the unit from temp. Remainder is then divided by ten, shifting the relevant data to the right by 1. An example would be where temp is 16, the element becomes 6 and then the remainder becomes 1, symbolising the carrying over the tens and above. A for loop is used to obtain the beginning of the number stored in the array, then another for loop to create the sum of each element. Finally this is outputted to console.