```c
#include <stdio.h>

void displayMenu();
char input(char* message);
unsigned long factorial(unsigned short num);
int leapYear(unsigned int year);
float maximum(float num1, float num2);
float division(int num1, int num2);
void switchStatement(char input);

int main(void)
{
    char choice='a';

    while(choice!='e' && choice!='E')
    {
        displayMenu();
        choice=input("\nChoice: ");
        if(choice<'A')
            return 1;

        switchStatement(choice);
    }

    return 0;
}

void displayMenu()
/*Displays text menu for user*/
{
    printf("\na) Factorial of a number");
    printf("\nb) Leap year or not");
    printf("\nc) Maximum of two numbers");
    printf("\nd) Division of two numbers");
    printf("\ne) Exit");
}

char input(char* message)
/*Asks user for inputed number after message
    Error Checks within a range
    Return -1 for error or users input*/
{
    char* error="\nPlease try again: ";
    char* terminate="\nProgram terminated\n";

    char n;
    printf("%s",message);
    scanf(" %c",&n);

    if(!(n>='a' && n<='e') && !(n>='A' && n<='E'))
    {
        printf("%s",error);
        scanf(" %c",&n);
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    }
    if(!(n>='a' && n<='e') && !(n>='A' && n<='E'))
    {
        printf("%s",terminate);
        return 'A'-1;
    }
    return n;
}

unsigned long factorial(unsigned short num)
/*Finds the factorial of an unsigned short num
    Returns factorial result as unsigned long*/
{
    if(num<=1)
        return 1;
    else
        return num*factorial(num-1);
}

int leapYear(unsigned int year)
/*Takes a year and determines if it's a leap year
    Returns 1 if leap year 0 if not*/
{
    if(year%4==0)
        if(year%100==0)
            if(year%400==0)
                return 1;
            else
                return 0;
        else
            return 1;
    else
        return 0;
}

float maximum(float num1, float num2)
/*finds the max of 2 floating inputs
    Returns max value*/
{
    float diff,max;
    diff = num1-num2;

    max=(diff>=0)? num1:num2;
    return max;
}

float division(int num1, int num2)
/*Divides two integer numbers
    Returns result as float*/
{
    float div;
    div=(float)num1/num2;
    return div;
```

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}

void switchStatement(char input)
/*Takes input char and chooses the appropriate operations
    Does not return a value*/
{
    switch(input)
    {
        case 'a':
        case 'A':
        {
            /*data*/
            unsigned long fact=0;
            unsigned short in1=0;

            /*input and error check*/
            while(in1<1 || in1>12)
            {
                printf("\nInput number between 1 and 12: ");
                scanf("%u",&in1);

                if(in1<1 || in1>12)
                printf("Number must be between 1 and 12. Please try again\n");
            }
            /*analyze and output*/
            fact=factorial(in1);
            printf("%u! = %lu\n",in1,fact);
            break;
        }
        case 'b':
        case 'B':
        {
            /*data*/
            unsigned int inputYear=0;

            /*input and error check*/
            while(inputYear<=0)
            {
                printf("\nInput year: ");
                scanf("%u",&inputYear);

                if(inputYear<=0)
                printf("\nYear must be positive. Please try again");
            }

            /*analyze and output*/
            if(leapYear(inputYear)==1)
                printf("%u is a leap year\n",inputYear);
            else
                printf("%u is not a leap year\n",inputYear);
        }
            break;
        case 'c':
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            case 'C':
            {
                /*data*/
                float num1, num2, max;

                /*input*/
                printf("\nNum1: ");
                scanf("%f",&num1);
                printf("Num2: ");
                scanf("%f",&num2);

                /*output and analyze*/
                max=maximum(num1,num2);
                printf("The maximum of %f and %f is %f\n",num1,num2,max);

            }
                break;
            case 'd':
            case 'D':
            {
                /*data*/
                int num=0,den=0;
                float quo;

                /*input and error check*/
                printf("\nNumerator: ");
                scanf("%d",&num);
                while(den==0)
                {
                    printf("Denominator: ");
                    scanf("%d",&den);
                    if(den==0)
                        printf("Cannot divide by zero. Please try again\n\n");
                }

                /*analyze and output*/
                quo=division(num,den);
                printf("%d / %d = %f\n",num,den,quo);
            }
                break;
            case 'e':
            case 'E':
                printf("\nExitting program\n\n");
                break;
            default:
                //should never happen because of prior analysis
                printf("error");
                break;
        }
    }
```