Task 1
```c
//******************************************************************
//*                    EEE2046F/EEE2050F C template                *
//*================================================================*
//* WRITTEN BY:
//* DATE CREATED:                                                   *
//* MODIFIED:                                                       *
//*================================================================*
//* PROGRAMMED IN: Eclipse Luna Service Release 1 (4.4.1)          *
//* TARGET:    PC or STM32F0?                                       *
//*================================================================*
//* DESCRIPTION:                                                    *
//*                                                                 *
//******************************************************************
// INCLUDE FILES
//==================================================================
#include <stdio.h>
//==================================================================
// GLOBAL CONSTANTS
//==================================================================


//==================================================================
// GLOBAL VARIABLES
//==================================================================


//==================================================================
// FUNCTION DECLARATIONS
//==================================================================


//==================================================================
// MAIN FUNCTION
//==================================================================
int main (void)
{
    printf("BINARY TO DECIMAL CONVERTOR\n");
    printf("Written by: Tumelo Lephadi\n");
    printf("Date: 2017\n");
    return(0);
}// End of main
//******************************************************************
// END OF PROGRAM
```

Task 2
```c
//********************************************************************

//********************************************************************
//*                    EEE2046F/EEE2050F C template                  *
//*================================================================*
//* WRITTEN BY:
//* DATE CREATED:                                                     *
//* MODIFIED:                                                         *
//*================================================================*
//* PROGRAMMED IN: Eclipse Luna Service Release 1 (4.4.1)             *
//* TARGET:    PC or STM32F0?                                         *
//*================================================================*
//* DESCRIPTION:                                                      *
//*                                                                   *
//********************************************************************
// INCLUDE FILES
//================================================================
#include <stdio.h>
//================================================================
// GLOBAL CONSTANTS
#define TITLE "BINARY TO DECIMAL CONVERTOR"
#define AUTHOR "Tumelo Lephadi"
#define YEAR 2017
//================================================================


//================================================================
// GLOBAL VARIABLES
//================================================================


//================================================================
// FUNCTION DECLARATIONS
//================================================================


//================================================================
// MAIN FUNCTION
//================================================================
int main (void)
{
    printf("**************************\n");
    printf("%s\n", TITLE);
    printf("Written by: %s\n", AUTHOR);
    printf("Date: 2017 %d\n", YEAR);
    printf("**************************\n");
    return(0);
}// End of main
//********************************************************************
// END OF PROGRAM
//********************************************************************
```

Task 3
```c
//********************************************************************
//*                    EEE2046F/EEE2050F C template                 *
//*==================================================================*
//* WRITTEN BY:
//* DATE CREATED:                                                    *
//* MODIFIED:                                                        *
//*==================================================================*
//* PROGRAMMED IN: Eclipse Luna Service Release 1 (4.4.1)            *
//* TARGET:    PC or STM32F0?                                        *
//*==================================================================*
//* DESCRIPTION:                                                     *
//*                                                                  *
//********************************************************************
// INCLUDE FILES
//====================================================================
#include <stdio.h>
//====================================================================
// GLOBAL CONSTANTS
#define TITLE "BINARY TO DECIMAL CONVERTOR"
#define AUTHOR "Tumelo Lephadi"
#define YEAR 2017
//====================================================================


//====================================================================
// GLOBAL VARIABLES
//====================================================================


//====================================================================
// FUNCTION DECLARATIONS
//====================================================================


//====================================================================
// MAIN FUNCTION
//====================================================================
int main (void)
{
    int decimal;
    printf("**************************\n");
    printf("%s\n", TITLE);
    printf("Written by: %s\n", AUTHOR);
    printf("Date: 2017 %d\n", YEAR);
    printf("**************************\n");
    printf("Enter a decimal number: ");
    scanf("%d", &decimal);
    printf("The number that you have entered is: %d\n", decimal);
    return(0);
}// End of main
//********************************************************************
// END OF PROGRAM
//********************************************************************
```

Task 4
```c
//********************************************************************
//*                    EEE2046F/EEE2050F C template              *
//*==================================================================*
//* WRITTEN BY:
//* DATE CREATED:                                                  *
//* MODIFIED:                                                      *
//*==================================================================*
//* PROGRAMMED IN: Eclipse Luna Service Release 1 (4.4.1)          *
//* TARGET:    PC or STM32F0?                                      *
//*==================================================================*
//* DESCRIPTION:                                                   *
//*                                                                *
//********************************************************************
// INCLUDE FILES
//==================================================================
#include <stdio.h>
#include <math.h>
//==================================================================
// GLOBAL CONSTANTS
#define TITLE "BINARY TO DECIMAL CONVERTOR"
#define AUTHOR "Tumelo Lephadi"
#define YEAR 2017
//==================================================================


//==================================================================
// GLOBAL VARIABLES
//==================================================================


//==================================================================
// FUNCTION DECLARATIONS
//==================================================================


//==================================================================
// MAIN FUNCTION
//==================================================================
int main (void)
{
    int decimal;
    printf("**************************\n");
    printf("%s\n", TITLE);
    printf("Written by: %s\n", AUTHOR);
    printf("Date: 2017 %d\n", YEAR);
    printf("**************************\n");
    while(decimal >= 0)
    {
        printf("Enter a decimal number: ");
        scanf("%d", &decimal);
        printf("The number that you have entered is: %d\n", decimal);
        if (decimal < 0)
        {
            printf("EXIT\n");
            break;
        }
    }
    return(0);
}// End of main
//********************************************************************
// END OF PROGRAM
//********************************************************************
```
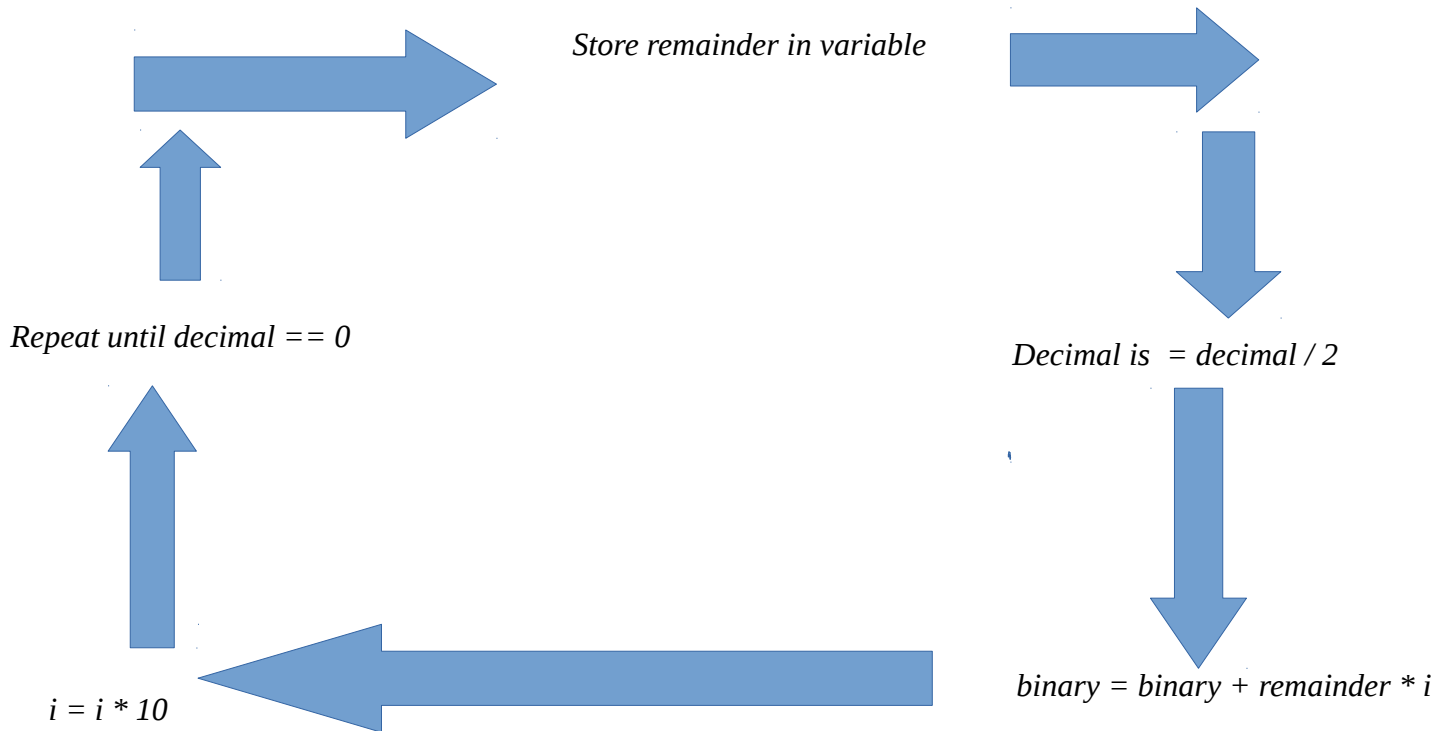
Task 5
```
//*****************************************************************
//*                    EEE2046F/EEE2050F C template               *
//*===============================================================*
//* WRITTEN BY:
//* DATE CREATED:                                                  *
//* MODIFIED:                                                      *
//*===============================================================*
//* PROGRAMMED IN: Eclipse Luna Service Release 1 (4.4.1)          *
//* TARGET:    PC or STM32F0?                                      *
//*===============================================================*
//* DESCRIPTION:                                                   *
//*                                                                *
//*****************************************************************
// INCLUDE FILES
//===============================================================
#include <stdio.h>
#include <math.h>
//===============================================================
// GLOBAL CONSTANTS
#define TITLE "BINARY TO DECIMAL CONVERTOR"
#define AUTHOR "Tumelo Lephadi"
#define YEAR 2017
//===============================================================


//===============================================================
// GLOBAL VARIABLES
//===============================================================


//===============================================================
// FUNCTION DECLARATIONS
//===============================================================


//===============================================================
// MAIN FUNCTION
//===============================================================
int main (void)
{
    int decimal;
    printf("**************************\n");
    printf("%s\n", TITLE);
    printf("Written by: %s\n", AUTHOR);
    printf("Date: 2017 %d\n", YEAR);
    printf("**************************\n");
    while(decimal >= 0)
    {
        printf("Enter a decimal number: ");
        scanf("%d", &decimal);
        printf("The number that you have entered is: %d\n", decimal);
        if (decimal < 0)
        {
            printf("EXIT\n");
            break;
        }
        else
        {
            printf("The log2 of the number is %.2f\n", log2(decimal));
            printf("The number divided by 2 is %d\n", (decimal / 2));
            printf("The remainder is %d\n", (decimal % 2));
        }
    }
    return(0);
}// End of main
//*****************************************************************
// END OF PROGRAM
//*****************************************************************
```

Decimal to binary algorithm
- Store the remainder of the decimal divided by 2 in a variable.
- Use integer division to divide the decimal by 2.
- Update the decimal to now be equal to the quotient of decimal divided by 2.
- For every division of the decimal by 2 the remainder must be multiplied by 10^n, n being the number of divisions.
- Binary is the sum of the initial binary value and the remainder.
- Repeat the algorithm until the decimal is equal to 0.

Store remainder in variable

Repeat until decimal == 0

Decimal is = decimal / 2

*i = i * 10*

*binary = binary + remainder * i*

Task 6

```c
//**********************************************************************
//*                     EEE2046F/EEE2050F C template                   *
//*=================================================================*
//* WRITTEN BY:
//* DATE CREATED:                                                    *
//* MODIFIED:                                                        *
//*=================================================================*
//* PROGRAMMED IN: Eclipse Luna Service Release 1 (4.4.1)           *
//* TARGET:    PC or STM32F0?                                        *
//*=================================================================*
//* DESCRIPTION:                                                     *
//*                                                                  *
//**********************************************************************
// INCLUDE FILES
//=================================================================
#include <stdio.h>
#include <math.h>
//=================================================================
// GLOBAL CONSTANTS
#define TITLE "BINARY TO DECIMAL CONVERTOR"
#define AUTHOR "Tumelo Lephadi"
#define YEAR 2017
//=================================================================


//=================================================================
// GLOBAL VARIABLES
//=================================================================


//=================================================================
// FUNCTION DECLARATIONS
//=================================================================
int dec2bin(int value)
{
        int remainder = 0, i = 1, binary = 0;
        while(value != 0)
        {
                remainder = value % 2;
                value = value / 2;
                binary = binary + (remainder * i);
                i = i * 10;
        }
        return binary;
}
//=================================================================
// MAIN FUNCTION
//=================================================================
int main (void)
{
        int decimal;
        printf("****************************\n");
        printf("%s\n", TITLE);
        printf("Written by: %s\n", AUTHOR);
        printf("Date: 2017 %d\n", YEAR);
        printf("****************************\n");
        while(decimal >= 0)
        {
                printf("Enter a decimal number: ");
                scanf("%d", &decimal);
                printf("The number that you have entered is: %d\n", decimal);
                if (decimal < 0)
                {
                        printf("EXIT\n");
                        break;
                }
                else
                {
                        printf("The log2 of the number is %.2f\n", log2(decimal));
                        printf("The number divided by 2 is %d\n", (decimal / 2));
                        printf("The remainder is %d\n", (decimal % 2));
                        printf("The binary value is: %d\n", dec2bin(decimal));
                }
        }
        return(0);
}// End of main
//**********************************************************************
// END OF PROGRAM
//**********************************************************************
```