**Solution**

**Task 2**

|  |  |  |
| --- | --- | --- |
| Decimal | Binary | Hexadecimal |
| **11342** | **10110001001110** | **2C4E** |

Decimal to Binary: Decimal to Hex:

11342 2 = 5671 R **0** 11342/**16** = 708.**875** 708 R **14** 14 = **E**

5671 2 = 2835 R **1** 708/16 = 44.26 44 R 4 4 = **16**

2835 2 = 1417 R **1**  44/16 = 2.75 2 R 12 12 = **C**

1417 2 = 708 R **1**  2/16 = 0.125 0 R 2 2 = **2**

708 2 = 354 R **0**

354 2= 177 R **0**

177 2= 88 R **1**

88 2= 44 R **0**

44 2 = 22 R **0**

22 2= 11 R **0**

11 2= 5 R **1**

5 2= 2 R **1**

2 2= 1 R **0**

1 2= 0 R **1**

**b)**

99999 2 R **1 Addition:**

49999 2 R 1 1 1 0 0 10 10 1 1 0 1 0 10 11 11 11 1 1

24999 2 R 1 + 1 0 1 1 0 0 0 1 0 0 1 1 1 0

12499 2 R **1 1 1 0 1 1 0 0 1 0 1 1 1 0 1 1 0 1**

6249 2 R **1**

3124 2 R **0**

1562 2 R **0 Subtraction:**

781 2 R **1** 1 1 0 0 0 0 1 1 0 1 0 0 1 1 1 1 1

390 2 R **0 -** 1 0 1 1 0 0 0 1 0 0 1 1 1 0

195 2 R **1** **1 0 1 0 1 1 0 1 0 0 1 0 1 0 0 0 1**

97 2 R **1**

48 2 R **0**

24 2 R **0**

12 2 R **0**

6 2 R **0**

3 2 R **1**

1 2 R **1**

**C)**

We use hex number system in order to reduce large strings of binary numbers by grouped them into 4 digits to be more understandable. Moreover , it is commonly used to represent combinations of colors for programming languages (e.g JavaScript , Python , CSS)

**Task 3**

Golib&Gulnoza

|  |  |  |
| --- | --- | --- |
| Lettters | Frequency | Encoding |
| G | 2 | 110 |
| O | 2 | 00 |
| L | 2 | 111 |
| B | 1 | 1101 |
| I | 1 | 1001 |
| U | 1 | 0111 |
| A | 1 | 1010 |
| & | 1 | 1000 |
| (2x3)+(2x2)+(2x3)+(1x4)+(1x4)+(1x4)+(1x4)+(1x4)= **36 bits** | | |

1

0

13

5

8

1

1

0

1

0

1

0

1

0

1

0

0

1

0

Z

1

0

4

O

3

2

U

N

2

L

G

4

2

B

A

I

&

**Task 4**

3, 4 , 2 ,4, 5, 2, 3, 7

2, 2, 3 ,4 ,4, 5, 7, in ascending order

**look up number is 2**

Step 1) Find midpoint through dividing total number by 2

**7/2 = 3.5 round up 4 and 4the number is midpoint**

**Midpoint is 4**

Step 2) If x < midpoint we ignore the range of right

**( 2<4 ) ~~4 ,4, 5, 7~~**

Step 3) Find midpoint 3/2 = 1.5 rounded 2

**Midpoint is 2**

Step 4) If x equal to Midpoint , number is found

**2 = 2 and number is found!**