|  |  |  |
| --- | --- | --- |
|  | | |
| Федеральное государственное бюджетное  образовательное учреждение высшего образования FPMI_ngtu_neti_rgb_polya«Новосибирский государственный технический университет» | | |
|  | | |
| Кафедра прикладной математики | | |
| Практическое задание № 1 | | |
| по дисциплине «Информатика» | | |
| **Представление данных в ЭВМ** | | |
|  | | |
|  | Бригада 7 | Дроздов Даниил |
| Группа ПМ-15 | Иванова Дарья |
| Вариант 7 | Заякин Дмитрий |
|  |  |
|  |  |
|  |  |
| Преподаватели | Тракимус Юрий Викторович |
|  |  |
| Новосибирск, 2022 | | |

1. **Перевести заданное число в двоично-десятичный код**

|  |  |
| --- | --- |
| 0 | 0000 |
| 1 | 0001 |
| 2 | 0010 |
| 3 | 0011 |
| 4 | 0100 |
| 5 | 0101 |
| 6 | 0110 |
| 7 | 0111 |
| 8 | 1000 |
| 9 | 1001 |

0111

0010

0011

1001

0110

0000

1000

0110

0001

1. **Расшифровать число из заданного двоично-десятичного кода**

0101

0111

0000

1001

0101

0110

0101

0010

0000

1. **Зашифровать и дешифровать заданные фрагменты текста, используя таблицу кодов ASCII**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| а | б | в | г | д | е | ж | з | и | й | к | л | м | н | о | п |
| 224 | 225 | 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 | 235 | 236 | 237 | 238 | 239 |
| р | с | т | у | ф | х | ц | ч | ш | щ | ъ | ы | ь | э | ю | я |
| 240 | 241 | 242 | 243 | 244 | 245 | 246 | 247 | 248 | 249 | 250 | 251 | 252 | 253 | 254 | 255 |

236

238

237

232

242

238

240

228

232

241

242

240

232

225

243

242

232

226

1. **Записать прямой и дополнительный коды восьмибитового числа**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  | | --- | --- | | **Число** | 9410 | | **Прямой код** | 010111102 | | **Дополнительный** | 010111102 | |  |  | | **Число** | 4510 | | **Прямой код** | 001011012 | | **Дополнительный** | 001011012 | | |  |  | | --- | --- | | **Число** | -11510 | | **Прямой код** | 011100112 | | **Инверсия** | 100011002 | | **Дополнительный** | 100011012 | |  |

1. **Записать целое число по его дополнительному коду**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  | | --- | --- | | **Дополнительный** | 11100101110111102 | | **Инверсия** | 11100101110111012 | | **Прямой код** | 00011010001000102 | | **Число** | -669010 | |  |  | | **Дополнительный** | 10000001011101102 | | **Инверсия** | 10000001011101012 | | **Прямой код** | 01111110100010102 | | **Число** | -3239410 | | |  |  | | --- | --- | | **Дополнительный** | 10100100011101102 | | **Инверсия** | 10100100011101012 | | **Прямой код** | 01011011100010102 | | **Число** | -2343410 | |  |

1. **Записать шестнадцатеричное восьмибайтное и четырехбайтное представления действительного числа, интерпретируя его как число с плавающей запятой**

а) |–414.938| = 110011110.11110000001…2 = 1.1001111011110000001…2 \* 28

= 8 + (210 – 1) = 1031 = 100000001112

|  |  |  |  |
| --- | --- | --- | --- |
| **Double** | **знак** | **порядок** | **мантисса** |
| Номер бита | |  | | --- | | 63 | | **1** | |  | | |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | **1** | **1** | | **C** | | | **0** | | | | **7** | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 51 | 50 | 49 | 48 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | | | 1 | 0 | 0 | **1** | 1 | 1 | **1** | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | | | **9** | | | | **E** | | | | **F** | | | | **0** | | | | **2** | | | | **0** | | | | **C** | | | | **4** | | | | **9** | | | | **B** | | | | **A** | | | | **5** | | | | **E** | | | | |
| число |
| **0x** |

Ответ: **C079EF020C49BA5E16**

|271.25| = 100001111.012 = 1.00001111012 \* 28

= 8 + (210 – 1) = 1031 = 100000001112

|  |  |  |  |
| --- | --- | --- | --- |
| **Double** | **знак** | **порядок** | **мантисса** |
| Номер бита | |  | | --- | | 63 | | 0 | |  | | |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | **1** | 1 | | **4** | | | **0** | | | | **7** | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 51 | 50 | 49 | 48 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | | | **0** | 0 | 0 | 0 | 1 | **1** | **1** | **1** | **0** | **1** | **0** | 0 | 0 | 0 | 0 | 0 | 0 | **0** | 0 | 0 | 0 | 0 | 0 | **0** | **0** | 0 | 0 | 0 | **0** | 0 | 0 | **0** | 0 | 0 | **0** | **0** | 0 | **0** | **0** | **0** | 0 | **0** | 0 | 0 | **0** | 0 | **0** | **0** | **0** | **0** | 0 | 0 | | | **0** | | | | **F** | | | | **4** | | | | **0** | | | | **0** | | | | **0** | | | | **0** | | | | **0** | | | | **0** | | | | **0** | | | | **0** | | | | **0** | | | | **0** | | | | |
| число |
| **0x** |

Ответ: **4070F4000000000016**

б) |–193.789| = 11000001.1100100111111011…2 = 1.10000011100100111111011…2\* 27

= 7 + (27 – 1) = 134 = 100001102

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Float** | **знак** | **порядок** | | | | | | | | | **мантисса** | | | | | | | | | | | | | | | | | | | | | | |
| номер | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| число | **1** | **1** | 0 | 0 | 0 | 0 | **1** | 1 | | **0** | **1** | **0** | **0** | 0 | **0** | 0 | **1** | **1** | 1 | **0** | 0 | **1** | **0** | 0 | 1 | 1 | 1 | 1 | 1 | **1** | 0 | 1 | 1 |
| **0x** | **С** | | | | **3** | | | | **4** | | | | | **1** | | | | **C** | | | | **9** | | | | **F** | | | | **B** | | | |

Ответ: **C341C9FB16**

|91,4844| = 1011011.01111100000000011…2 = 1.01101101111100000000011…2 \* 26

= 6 + (27 – 1) = 133 = 100001012

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Float** | **знак** | **порядок** | | | | | | | | | **мантисса** | | | | | | | | | | | | | | | | | | | | | | |
| номер | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| число | **0** | **1** | 0 | 0 | 0 | 0 | **1** | **0** | | 1 | **0** | 1 | **1** | 0 | **1** | 1 | **0** | **1** | **1** | 1 | 1 | 1 | **0** | 0 | **0** | **0** | **0** | **0** | 0 | 0 | 0 | **1** | **1** |
| **0x** | **4** | | | | **2** | | | | **B** | | | | | **6** | | | | **F** | | | | **8** | | | | **0** | | | | **3** | | | |

Ответ: **42B6F80316**

1. **Преобразовать шестнадцатеричный восьмибайтный и четырехбайтный коды в число с плавающей запятой**
2. C39E880016

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **знак** | **порядок** | | | | | | | | | **мантисса** | | | | | | | | | | | | | | | | | | | | | | | |
| 0x | **C** | | | | **3** | | | | | **9** | | | | | **E** | | | | **8** | | | | **8** | | | | **0** | | | | **0** | | | |
| число | **1** | **1** | 0 | 0 | | 0 | 0 | **1** | **1** | **1** | | 0 | 0 | **1** | **1** | **1** | **1** | 0 | **1** | 0 | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| номер | 31 | 30 | 29 | 28 | | 27 | 26 | 25 | 24 | 23 | | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

100001112= 135

135 – (27 – 1) = 8

1.0011110100012\*28 = 100111101.00012= 317.0625

Ответ: **-317.0625**

4319700016

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **знак** | **порядок** | | | | | | | | | **мантисса** | | | | | | | | | | | | | | | | | | | | | | | |
| 0x | **4** | | | | **3** | | | | | **1** | | | | | **9** | | | | **7** | | | | **0** | | | | **0** | | | | **0** | | | |
| число | 0 | **1** | 0 | 0 | | 0 | 0 | **1** | **1** | 0 | | 0 | 0 | **1** | **1** | 0 | 0 | **1** | 0 | **1** | **1** | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| номер | 31 | 30 | 29 | 28 | | 27 | 26 | 25 | 24 | 23 | | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

100001102 = 134

134 – (27 – 1) = 7

1.001100101112\* 27 = 10011001.01112= 153.4375

Ответ: **153.4375**

б) C05AEF000000000016

|  |  |  |  |
| --- | --- | --- | --- |
|  | **знак** | **порядок** | **мантисса** |
| Номер бита | |  | | --- | | 63 | | **1** | |  | | |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 | **1** | | **C** | | | **0** | | | | **5** | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 51 | 50 | 49 | 48 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | | **1** | 0 | **1** | 0 | **1** | **1** | **1** | 0 | **1** | **1** | **1** | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **A** | | | | **E** | | | | **F** | | | | **0** | | | | **0** | | | | **0** | | | | **0** | | | | **0** | | | | **0** | | | | **0** | | | | **0** | | | | **0** | | | | **0** | | | | |
| число |
| 0x |

100000001012= 1029

1029 – (210 – 1) = 6

1.1010111011112 \* 28 = 1101011.1011112= 107.734375

Ответ: **-107.734375**

405AC9000000000016

|  |  |  |  |
| --- | --- | --- | --- |
|  | **знак** | **порядок** | **мантисса** |
| Номер бита | |  | | --- | | 63 | | 0 | |  | | |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | 0 | **1** | | **4** | | | **0** | | | | **5** | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 51 | 50 | 49 | 48 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | | **1** | 0 | **1** | 0 | **1** | **1** | 0 | 0 | **1** | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **A** | | | | **C** | | | | **9** | | | | **0** | | | | **0** | | | | **0** | | | | **0** | | | | **0** | | | | **0** | | | | **0** | | | | **0** | | | | **0** | | | | **0** | | | | |
| число |
| 0x |

100000001012 = 1029

1029 – (210 – 1) = 6

1.1010110010012\* 26 = 1101011.0010012= 107.140625

Ответ: **107.140625**