**Домашняя работа № 1 по дискретной математике**

**«Представление чисел с фиксированной и плавающей запятой в различных форматах»**

Вариант 111

Выполнил Куперштейн Дмитрий, группа P3113, табельный номер: 269359

|  |  |  |  |
| --- | --- | --- | --- |
| **A** = 1875 | **B** = 0,73 | **R** = 4242900016 | **S** = BDB3000016 |

1. Заданное число **A** представить в виде двоично-кодированного десятичного числа:
   1. в упакованном формате (BCD)
   2. в неупакованном формате (ASKII)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0001.1000 | |  | 0111.0101 | |
| 1 | 8 |  | 7 | 5 |

а)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0011.0001 | |  | 0011.1000 | |  | 0011.0111 | |  | 0011.0101 | |
|  | 1 |  |  | 8 |  |  | 7 |  |  | 5 |

б)

1. Заданное число **A** и **-A** представить в форме с фиксированной запятой

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 |  | 0 | 1 | 1 | 1 |  | 0 | 1 | 0 | 1 |  | 0 | 0 | 1 | 1 |
| 15 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 0 |

A:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | 1 | 1 |  | 1 | 0 | 0 | 0 |  | 1 | 0 | 1 | 0 |  | 1 | 1 | 0 | 1 |
| 15 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 0 |

-A:

1. Заданные числа **A** и **B** представить в форме с плавающей запятой в формате *Ф1*

A:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 |  | 0 | 1 | 0 | 1 |  | 0 | 0 | 1 | 1 |  | 0 | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 |
| 0 | 1 |  |  |  |  |  | 7 | 8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 31 | |

B:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |  | 1 | 0 | 1 | 0 |  | 1 | 1 | 1 | 0 |  | 0 | 0 | 0 | 1 |  | 0 | 1 | 0 | 0 |  | 0 | 1 | 1 | 1 |
| 0 | 1 |  |  |  |  |  | 7 | 8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 31 | |

1. Заданные числа **A** и **B** представить в форме с плавающей запятой в формате *Ф2*

A:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 |  | 1 | 0 | 1 | 0 |  | 0 | 1 | 1 | 0 |  | 0 | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 |
| 31 | 30 |  |  |  |  |  |  | 23 | 22 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0 | |

B:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |  | 1 | 0 | 1 | 0 |  | 1 | 1 | 1 | 0 |  | 0 | 0 | 0 | 1 |  | 0 | 1 | 0 | 0 |  | 0 | 1 | 1 | 1 |
| 31 | 30 |  |  |  |  |  |  | 23 | 22 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0 | |

1. Заданные числа **A** и **B** представить в форме с плавающей запятой в формате *Ф3*

A:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 |  | 1 | 0 | 1 | 0 |  | 0 | 1 | 1 | 0 |  | 0 | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 |
| 31 | 30 |  |  |  |  |  |  | 23 | 22 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0 | |

B:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 |  | 1 | 0 | 1 | 0 |  | 1 | 1 | 1 | 0 |  | 0 | 0 | 0 | 1 |  | 0 | 1 | 0 | 0 |  | 0 | 1 | 1 | 1 |
| 31 | 30 |  |  |  |  |  |  | 23 | 22 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0 | |

1. Найти значения чисел **Y** и **Z** по из заданным шестнадцатеричным представлениям **R** и **S** в форме с плавающей запятой в формате *Ф1*

R:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |  | 0 | 0 | 1 | 0 |  | 0 | 1 | 0 | 0 |  | 0 | 0 | 1 | 0 |  | 1 | 0 | 0 | 1 |  | 0 | 0 | 0 | 0 |
| 0 | 1 |  |  |  |  |  | 7 | 8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 31 | |

S:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |  | 1 | 1 | 0 | 1 |  | 1 | 0 | 1 | 1 |  | 0 | 0 | 1 | 1 |  | 0 | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 |
| 0 | 1 |  |  |  |  |  | 7 | 8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 31 | |

Найдём число Y:

Мантисса числа: 0,4242916

Порядок числа равен разности характеристики и величины смещения (64):

72 – 64 = 8

Число X: 0,424216 ⋅ 168 = 42429000,016 = 1111658496,0

Найдём число Z:

Мантисса числа: 0,BDB316

Порядок числа равен разности характеристики и величины смещения (64):

72 – 64 = 8

Число Z: 0,BDB316 ⋅ 168 = BDB30000,016 = 3182624768,0

1. Найти значения чисел **Y** и **Z** по из заданным шестнадцатеричным представлениям **R** и **S** в форме с плавающей запятой в формате *Ф2*

R:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |  | 0 | 1 | 0 | 0 |  | 1 | 0 | 0 | 0 |  | 0 | 1 | 0 | 1 |  | 0 | 0 | 1 | 0 |  | 0 | 0 | 0 | 0 |
| 31 | 30 |  |  |  |  |  |  | 23 | 22 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0 | |

S:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |  | 1 | 1 | 0 | 1 |  | 1 | 0 | 1 | 1 |  | 0 | 0 | 1 | 1 |  | 0 | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 |
| 31 | 30 |  |  |  |  |  |  | 23 | 22 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0 | |

Найдём число Y:

Мантисса числа: 0,10000100100001010012

Порядок числа равен разности характеристики и величины смещения (128):

159 – 128 = 31

Число X: 0,10000100100001010012 ⋅ 231 = 4242900016 = 1111658496,0

Найдём число Z:

Мантисса числа: 0,10111101101100112

Порядок числа равен разности характеристики и величины смещения (128):

160 – 128 = 32

Число Y: 0,10111101101100112 ⋅ 231 = BDB30000,016 = 3182624768,0

1. Найти значения чисел **Y** и **Z** по из заданным шестнадцатеричным представлениям **R** и **S** в форме с плавающей запятой в формате *Ф3*

R:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |  | 0 | 1 | 0 | 0 |  | 1 | 0 | 0 | 0 |  | 0 | 1 | 0 | 1 |  | 0 | 0 | 1 | 0 |  | 0 | 0 | 0 | 0 |
| 31 | 30 |  |  |  |  |  |  | 23 | 22 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0 | |

S:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 |  | 1 | 1 | 0 | 1 |  | 1 | 0 | 1 | 1 |  | 0 | 0 | 1 | 1 |  | 0 | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 |
| 31 | 30 |  |  |  |  |  |  | 23 | 22 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0 | |

Найдём число Y:

Мантисса числа: 1,0000100100001010012

Порядок числа равен разности смещённого порядка и величины смещения (127):

157 – 127 = 30

Число X: 1,0000100100001010012 ⋅ 230 = 4242900016 = 1111658496,0

Найдём число Z:

Мантисса числа: 1,0111101101100112

Порядок числа равен разности смещённого порядка и величины смещения (127):

158 – 127 = 31

Число Y: 1,0111101101100112 ⋅ 231 = BDB30000,016 = 3182624768,0