Министерство образования и науки РФ

Федеральное государственное автономное

образовательное учреждение высшего образования

«Санкт-Петербургский национальный исследовательский университет

информационных технологий, механики и оптики»

**факультет программной инженерии и компьютерной техники**

**ДОМАШНЯЯ РАБОТА № 1**

по дисциплине

‘Дискретная Математика’

Вариант №20

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Санкт-Петербург, 2021

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# Задание 1

## Пункт 1

A = 2000

А) BCD

|  |  |  |  |
| --- | --- | --- | --- |
| 0010.0000 | | 0000.0000 | |
| 2 | 0 | 0 | 0 |

Б) ASCII

|  |  |  |  |
| --- | --- | --- | --- |
| 0011.0010 | 0011.0000 | 0011.0000 | 0011.0000 |
| 2 | 0 | 0 | 0 |

## Пункт 2

A = 200010

200010 = 111 1101 00002

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| +A = | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
|  | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| -A = | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
|  | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

## Пункт 3

А = 200010

А = 7D016 = (0,7D)16 \* 163

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  | 7 | В | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 |  | 0 | 0 | 1 | 1 | 0111 | 1011 | 0000 | 0000 | 0000 | 0000 |
| + | Характеристика | | | | | | | | Мантисса | | | | | |

B = 0.2510

B = 0.416 = 0.416 \* 160

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  | 4 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 |  | 0 | 0 | 0 | 0 | 0100 | 0000 | 0000 | 0000 | 0000 | 0000 |
| + | Характеристика | | | | | | | | Мантисса | | | | | |

## Пункт 4

A = 200010 = 111 1101 00002 = 0,1 111 1012 \* 211

Скрытый бит

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 0 | 0 |  | 1 | 0 | 1 | 1 | 111 | 1010 | 0000 | 0000 | 0000 | 0000 |
| + | Характеристика | | | | | | | | | Мантисса | | | | | |

B = 0.2510 = 0.012 = 0,12 \* 2-1

Скрытый бит

000 0001 – прямой код порядка

0111 1111 – дополненный код порядка

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 1 | 1 | 1 |  | 1 | 1 | 1 | 1 | 000 | 0000 | 0000 | 0000 | 0000 | 0000 |
| + | Характеристика | | | | | | | | | Мантисса | | | | | |

## Пункт 5

A = 200010 = 1 1111 0100 002 =1,111 1012 \* 210

Скрытый бит

XA = PA + 127 = 137 = 1000 10012

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 0 | 0 | 0 |  | 1 | 0 | 0 | 1 | 111 | 1010 | 0000 | 0000 | 0000 | 0000 |
| + | Смещенный порядок | | | | | | | | | Мантисса | | | | | |

B = 0,2510 = 0.416 = 0,012 = 12 \* 2-2

Скрытый бит

XB = PB + 127 = 125 = 111 11012

111 1101 – прямой код порядка

000 0010 – обратный код порядка

0000 0010 – смещенный порядка

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 |  | 0 | 0 | 1 | 0 | 000 | 0000 | 0000 | 0000 | 0000 | 0000 |
| + | Смещенный порядок | | | | | | | | | Мантисса | | | | | |

## Пункт 6

R = C1B1 0000

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| C | | | |  | 1 | | | | B | 1 | 0 | 0 | 0 | 0 |
| 1 | 1 | 0 | 0 |  | 0 | 0 | 0 | 1 | 1011 | 0001 | 0000 | 0000 | 0000 | 0000 |
| - | Характеристика | | | | | | | | Мантисса | | | | | |

PY = XY - 64 = 1

Y = -(0,B1)16 \* 161

Y = -(B,1)16

**Y = -11.0625**

S = 3D40 0000

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3 | | | |  | D | | | | 4 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 |  | 1 | 1 | 0 | 1 | 0100 | 0000 | 0000 | 0000 | 0000 | 0000 |
| - | Характеристика | | | | | | | | Мантисса | | | | | |

PZ = XZ – 64 = 61 – 64 = -3

Z = 0,416 \* 16-3 = 0,000416 = 4/164 = 4/216 = 2-14 6,1 \* 10-5

## Пункт 7

R = C1B1 0000

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| С | | | | 1 | | | | B | | | 1 | 0 | 0 | 0 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 011 | | 0001 | 0000 | 0000 | 0000 | 0000 |
| + | Характеристика | | | | | | | | | Мантисса | | | | | |

PV = XV – 128 = 131 – 128 = 3

V = -(0,10110001)2 \* 23

Скрытый бит

V = 101,100012 = 5,015625

S = 3D40 0000

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3 | | | | D | | | | 4 | | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 100 | 0000 | 0000 | 0000 | 0000 | 0000 |
| - | Характеристика | | | | | | |  | Мантисса | | | | | |

PW = XW – 128 = 122 – 128 = -6

W = 0,112 \* 2-6

W = 0,0000 00112 = 3 \* 2-8 = 3 / 256 0.01172

## Пункт 8

R = C1B1 0000

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| С | | | | 1 | | | | B | | | 1 | 0 | 0 | 0 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 011 | | 0001 | 0000 | 0000 | 0000 | 0000 |
| + | Характеристика | | | | | | | | | Мантисса | | | | | |

PT = XT – 127 = 131 – 127 = 4

T = -(1,0110001)2 \* 24 = 10110,0012

Скрытый бит

T = 22.125

S = 3D40 0000

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3 | | | | D | | | | 4 | | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 100 | 0000 | 0000 | 0000 | 0000 | 0000 |
| - | Характеристика | | | | | | |  | Мантисса | | | | | |

PQ = XQ – 127 = 122 – 127 = -5

Q = 12 \* 2-5 = 0,000012

Q = 0,03125