12. 9. 2023

# Číselné soustavy

## Z desítkové do binární

8214 – 10 0000 0001 0110

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8214/2 | 4107/2 | 2053/2 | 1026/2 | 513/2 | 256/2 | 128/2 | 64/2 | 32/2 | 16/2 |
| 4107 zb 0 | 2053 zb 1 | 1026 zb 1 | 513  zb 0 | 256  Zb 1 | 128  Zb 0 | 64  Zb 0 | 32  Zb 0 | 16  Zb 0 | 8  Zb 0 |

|  |  |  |  |
| --- | --- | --- | --- |
| 8/2 | 4/2 | 2/2 | ½ |
| 4  Zb 0 | 2  Zb 0 | 1  Zb 0 | 0  Zb 1 |

489 – 1111 0100 1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 489/2 | 244/2 | 122/2 | 61/2 | 30/2 |
| 244  Zb 1 | 122  Zb 0 | 61  Zb 0 | 30  Zb 1 | 15  Zb 0 |
| 15/2 | 7/2 | 3/2 | ½ |  |
| 7  Zb 1 | 3  Zb 1 | 1  Zb 1 | 0  Zb 1 |  |

1562 – 101 1011 1000

|  |  |  |  |
| --- | --- | --- | --- |
| 1562/2 | 732/2 | 366/2 | 183/2 |
| 732  Zb 0 | 366  Zb 0 | 183  Zb 0 | 91  Zb 1 |
| 91/2 | 45/2 | 22/2 | 11/2 |
| 45  Zb 1 | 22  Zb 1 | 11  Zb 0 | 5  Zb 1 |
| 5/2 | 2/2 | ½ |  |
| 2  Zb 1 | 1  Zb 0 | 0  Zb 1 |  |

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# Součet v binární soustavě

1 0 0 0 1 1 1  
 1 1 0 1 0 1 0  
1 0 1 1 0 0 0 1

1 0 1 1 1 0 1  
 0 1 0 0 1 1 1  
1 0 0 0 0 1 0 0

1 0 1 1 0 1  
 0 1 0 0 0 1  
 1 0 1 0 0 0  
1 1 0 0 1 1 0

# Odečítání v binární soustavě

1 0 0 1 1  
- 0 0 1 0 1 neguju na 1 1 0 1 0 k tomu prictu 1 tzn 1 1 0 1 1 a k tomu prictu to cislo nahore

1 1 0 1 1  
 1 0 0 1 1  
1 0 1 1 1 0

## Z desítkové do šestnáctkové

183 – B7

|  |  |  |  |
| --- | --- | --- | --- |
| 183/16 | 11/16 |  |  |
| 11  Zb 7 | 0  Zb 11 |  |  |

120 – 78

|  |  |
| --- | --- |
| 120/16 | 7/16 |
| 7  Zb 8 | 0  Zb 7 |

1023 – 3EE

|  |  |  |
| --- | --- | --- |
| 1023/16 | 63/16 | 3/16 |
| 63  Zb 15 | 3  Zb 15 | 0  Zb 3 |

1562 – 61A

|  |  |  |
| --- | --- | --- |
| 1562/16 | 97/16 | 6/16 |
| 97  Zb 10 | 6  Zb 1 | 0  Zb 6 |

## Z binární na desítkovou

101101 = 32 + 8 + 4 + 1 = 45

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 \* 25 | 0 \* 24 | 1 \* 23 | 1 \* 22 | 0 \* 21 | 1 \* 20 |
| 32 | 0 | 8 | 4 | 0 | 1 |

1110 1111 = 128 + 64 + 32 + 8 + 4 + 2 + 1 = 192 + 40 + 12 + 3 = 232 + 15 = 247

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 \* 2 na 7 | 1 \* 2 na 6 | 1 \* 2 na 5 | 0 \* 2 na 4 | 1 \* 2 na 3 | 1 \* 2 na 2 | 1 \* 2 na 1 | 1 \* 2 na 0 |
| 128 | 64 | 32 | 0 | 8 | 4 | 2 | 1 |

## Z šestnáctkové na desítkovou

BC1 = 2816 + 292 + 1 = 3009

|  |  |  |
| --- | --- | --- |
| 11 \* 16 na 2 | 12 \* 16 na 1 | 1 \* 16 na 0 |
| 11 \* 256 | 12 \* 16 | 1 \* 1 |
| 2816 | 192 | 1 |

CB2 = 3072 + 176 + 2 = 3250

|  |  |  |
| --- | --- | --- |
| 12 \* 16 na 2 | 11 \* 16 na 1 | 2 \* 16 na 0 |
| 12 \* 256 | 11 \* 16 | 2 \* 1 |
| 3072 | 176 | 2 |

F23 = 4131

|  |  |  |
| --- | --- | --- |
| 16 \* 16 na 2 | 2 \* 16 na 1 | 3 \* 16 na 0 |
| 16 na 3 | 2 \* 16 | 3 \* 1 |
| 4092 | 32 | 3 |

## Z binární na šestnáctkovou

11 1001 1101 = 0011 1001 1101 = 39D

10 1101 0111 = 0010 1101 0111 = 2D7

1111100001111 = 1 1111 0000 1111 = 1F0F

## Z šestnáctkové na binární

428 = 0100 0010 1000

110 1110 1010 1100 = 6EAC

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## Sčítání BCD

387 0011 1000 0111  
+ 465 0100 0110 0101  
 0111 1110 1100 k cislum vetsim nez 9 prictu 6  
 0110 0010  
 1000 0101 0010  
 (8 5 2)

628 0110 0010 1000  
+ 197 0001 1001 0111  
 0111 1011 1111 tzn 7 11 15  
 0110 0110  
 1000 0010 0101  
 (8 2 5)

## Sčítání v hexa

3EC 11 + 12 = 23 (tzn 16 a 7) → 1 + 12 + 14 = 27 (tzn 16 (takze zase prictu 1) a 11) → 1 + 10 + 3 = 14  
ACB  
EB7

A5E 7 + 14 = 21 (tzn 16 a 5) → 1 + 11 + 5 = 17 (tzn 16 a 1) → 1 + 12 + 10 = 23 (tzn 16 a 7) → 1  
 CB7  
1715

CA8B 1 + 11 = 12 → 14 + 8 = 22 (tzn 16 a 6) → 1 + 2 + 10 = 13 → 7 + 12 = 19 (tzn 16 a 3) → 1  
 72E1  
13D6C

## Sčítání s doplňkem

1011 0111  
- 0000 1011 → zneguju → 1111 0100

1  
 1111 0101  
 1011 0111  
 1 0110 1100

## Opakování

110 1111  
 1 0110  
 101 1001  
1101 1110

100 0110  
 10 1111  
 101 1001  
1100 1110

26 11010  
-13 01101 → negace → 10010  
 1  
 10011  
 11010  
  **1**01101

63 111111  
-23 - 010110 → negace → 101001  
 1  
 101010  
 111111  
 **0**101001