# Quiz 2

1. Convert $-10799_{10}$ to 2s compliment, 16-bit binary.

Sign -1
Initial dividend = 10799

| Dividend | Divisor | Quotient | Remainder |
|---|---|---|---|
| 10799 | 2 | 5399 | 1 |
| 5399 | 2 | 2699 | 1 |
| 2699 | 2 | 1349 | 1 |
| 1349 | 2 | 674 | 1 |
| 674 | 2 | 337 | 0 |
| 337 | 2 | 168 | 1 |
| 168 | 2 | 84 | 0 |
| 84 | 2 | 42 | 0 |
| 42 | 2 | 21 | 0 |
| 21 | 2 | 10 | 1 |
| 10 | 2 | 5 | 0 |
| 5 | 2 | 2 | 1 |
| 2 | 2 | 1 | 0 |
| 1 | 2 | 0 | 1 |
| 0 | 2 | 0 | 0 |
| 0 | 2 | 0 | 0 |

Reading bottom to top: ~~0010 1010 0010 1111~~ 0010 1010 0010 1111
Compliment: ~~1101 0101 1101 0000~~ 1101 0101 1101 0000
Add one: ~~1101 0101 1101 0001~~ 1101 0101 1101 0001

Result: ~~1101 0011 0101 0001~~ 1101 0101 1101 0001

Professor: Goodrum

2. Convert $-4275_{10}$ to 2s compliment, 16-bit hexadecimal.

Sign -1
Initial dividend = 4275

| Dividend | Divisor | Quotient | Remainder |
|---|---|---|---|
| 4275 | 16 | 267 | 3 |
| 267 | 16 | 16 | B |
| 16 | 16 | 1 | 0 |
| 1 | 16 | 0 | 1 |

Reading bottom to top: 10B3
Compliment: EF4C
Add one: EF4D

Result: EF4D

Professor: Goodrum

3. Convert the 2s compliment, 16-bit binary value: 1100011111101001 to decimal.

Sign: -1
Compliment: 0011100000010110
Add one: 0011100000010111

| Bit | Sum/Multiplicand | Multiplier | Product |
|---|---|---|---|
| 0 | 0 | 2 | 0 |
| 0 | 0 | 2 | 0 |
| 1 | 1 | 2 | 2 |
| 1 | 3 | 2 | 6 |
| 1 | 7 | 2 | 14 |
| 0 | 14 | 2 | 28 |
| 0 | 28 | 2 | 56 |
| 0 | 56 | 2 | 112 |
| 0 | 112 | 2 | 224 |
| 0 | 224 | 2 | 448 |
| 0 | 448 | 2 | 896 |
| 1 | 897 | 2 | 1794 |
| 0 | 1794 | 2 | 3588 |
| 1 | 3589 | 2 | 7178 |
| 1 | 7179 | 2 | 14358 |
| 1 | 14359 | | |

Apply sign: -14359

Result: -14359

Professor: Goodrum

4. Convert the 2s compliment, 16-bit hexadecimal value: 41BD to decimal.

Sign: 1

| Nibble | Decimal | |
|---|---|---|
| 4 | 4 | 4 |
| | | *16 |
| | | 64 |
| 1 | 1 | +1 |
| | | 65 |
| | | *16 |
| | | 390 |
| | | +650 |
| | | 1040 |
| B | 11 | +11 |
| | | 1051 |
| | | *16 |
| | | 6306 |
| | | +10510 |
| | | 16816 |
| D | 13 | +13 |
| | | 16829 |

Apply sign: 16829

Result: 16829 ⇒ 16829

Professor: Goodrum

5. Add the 2s compliment, 16-bit hexadecimal values: 02E4 and ECDC while staying in hexadecimal.

| | | | | |
|---|---|---|---|---|
| Carry | | 1 | 1 | |
| First | 0 | 2 | E | 4 |
| Second | E | C | D | C |
| Sum | E | F | C | 0 |

Result: EFC0

Result: EFC0

Professor: Goodrum