Java Illuminated 5th edition Anderson Solutions Manual

SKU: 9781284140996-SOLUTIONS

1.7 Exercises, Problems, and Projects

1.7.1 Multiple Choice Exercises:

1. Java
2. Linux
3. 24
4. servers
5. is even
6. is odd
7. is a multiple of 4
8. true
9. Windows
10. C
11. .java
12. .class
13. `javac Hello.java`
14. `java Hello`

1.7.2 Converting Numbers

15. 0100 0011
16. 0110 0001 1100
17. 21
18. 3,413
19. 0x15
20. 1101 1000 1111

1.7.3 General Questions

21. 2^7, or 128
22. 2.5 billion
23. 2600 MHz (or 2.6 GHz)
24. with 5 bits, 2^5 or 32 colors; with n bits, 2^n colors
25. red = 51; green = 171; blue = 18
26. 256 shades of grey, including black and white
27. OOP/code reuse, symbolic/easy to use, platform independent
28. *javac*
29. read first number
    read second number
    set product to (first number * second number)
    output product
30. set first total to 0
    set second total to 0
    while there is a number to read, repeat next instruction

Java Illuminated 5th edition Anderson Solutions Manual

```
        if number is greater than or equal to 10
                add number to first total
        else
                add number to second total
end while
output first total
output second total
```


Java Illuminated 5th edition Anderson Solutions Manual

Chapter 1 – Exercise # 35 - Group Project

1. Convert 0xC3E into an octal number

We propose 2 algorithms:

Algorithm A: convert to decimal, then convert to octal

First we convert 0xC3E to its decimal equivalent:

C = 12 and E = 14
$0xC3E = 12 * 16^2 + 3 * 16^1 + 14 * 16^0$
0xC3E = 12 * 256 + 3 * 16 + 14 * 1
0xC3E = 3072 + 48 + 14 = 3134

Then we convert its decimal equivalent, 3134, to its octal representation.

To do that, we decompose 3134 as a sum of powers of 8 with coefficients between 0 and 7
The powers of 8 are: 1, 8, 64, 512, 4096, …

3134 = 6 * 512 + 62
= 6 * 512 + 7 * 8 + 6

3134 = 6 * 512 + 7 * 8 + 6 * 1
$= 6 * 8^3 + 7 * 8^1 + 6 * 8^0$

We find that 3134 is 06076 in the octal system.

Thus, 0xC3E is 06076 in octal representation.

Algorithm B: convert to binary, then convert to octal

First we convert 0xC3E to its binary equivalent:

C = 1100, 3 = 0011, and E = 1110
0xC3E = 1100 0011 1110 = 110000111110

Then we regroup the bits 3 at a time starting from the right

0xC3E = 110 000 111 110

Then we convert to octal

0xC3E = 6 0 7 6 = 6076

Thus, 0xC3E is 06076 in octal representation.

2. Convert 0377 into a hexadecimal number

We propose 2 algorithms:

Algorithm A: convert to decimal, then to hexadecimal

First we convert 0377 to its decimal equivalent

$$\begin{aligned} 0377 &= 3 * 8^2 + 7 * 8^1 + 7 * 8^0 \\ &= 3 * 64 + 7 * 8 + 7 * 1 \\ &= 192 + 56 + 7 \\ &= 255 \end{aligned}$$

Then we convert its decimal equivalent, 255, to its hexadecimal representation

To do that, we decompose 255 as a sum of powers of 16 with coefficients between 0 and 15
The powers of 16 are: 1, 16, 256, ...

$$\begin{aligned} 255 &= 15 * 16 + 15 \\ &= 15 * 16 + 15 * 1 \\ &= 15 * 16^1 + 15 * 16^0 \end{aligned}$$

Since 15 is F in hexadecimal notation, 255 is 0xFF in the hexadecimal system.

Thus, 0377 is 0xFF in hexadecimal representation.

Algorithm B: convert to binary, then to hexadecimal

Convert to binary

0377 = 011 111 111 = 011111111

Then we regroup the bits 4 at a time

0377 = 011111111 = 0 1111 1111 = 1111 1111

Then we convert to hexadecimal

0377 = F F = 0xFF

3 – How to convert, in general, a hexadecimal number to its octal representation and vice versa.

Again, we propose 2 algorithms:

Algorithm A: convert to decimal, then octal or hexadecimal

Convert a hexadecimal number h to its octal representation:

Step 1: convert h to its decimal representation, d
Each digit in h represents the coefficient of the corresponding power of 16
For the ith rightmost digit, the corresponding power of 16 is 16^i
Step 2: convert d to its octal representation, o
Decompose d into a sum of powers of 8 with coefficients from 0 to 7
The coefficients represent d in the octal system.

Convert an octal number o to its hexadecimal representation:
Step 1: convert o to its decimal representation, d
Each digit in o represents the coefficient of the corresponding power of 8
For the ith rightmost digit, the corresponding power of 8 is 8^i

Step 2: convert d to its hexadecimal representation, h
Decompose d into a sum of powers of 16 with coefficients from 0 to 15
The coefficients represent d in the hexadecimal system.

Algorithm B: convert to binary, then to octal or hexadecimal

Convert a hexadecimal number h to its octal representation:

Step 1: convert h to its binary representation, b
Each digit in h is converted to its 4 bits representation in binary (from 0000 for 0 to 1111 for F)

Step 2: convert b to its octal representation, o
Regroup the bits by groups of 3, starting from the right, and zero filling if necessary to create 3 bits for the leftmost group. Then convert each group to its octal representation

Convert an octal number o to its hexadecimal representation:

Step 1: convert o to its binary representation, b
Each digit in o is converted to its 3 bits representation in binary (from 000 for 0 to 111 for 7)

Step 2: convert b to its hexadecimal representation, h
Regroup the bits by groups of 4, starting from the right, and zero filling if necessary to create 4 bits for the leftmost group. Then convert each group to its hexadecimal representation

Java Illuminated 5th edition Anderson Solutions Manual