Brandon Bardwell

2/14/20

Discrete Structures

Homework 3:

Division and its quirky quotients.

We looked at a lot of factoring as well as hex code along with division in this section of homework.

Section 4.1, Number 9

In this question I was asked to find the quotient and the remainder of certain division problems.

<https://www.khanacademy.org/computing/computer-science/cryptography/modarithmetic/a/the-quotient-remainder-theorem>

When working these problems, it can help to use an online calculator to give a correct answer every time.

|  |  |  |  |
| --- | --- | --- | --- |
| What are the quotient and remainder when... |  | Quotient | Remainder |
| a | 19 is divided by 7? | 2 | 5 |
|  |  |  |  |
| b | −111 is divided by 11 | -11 | 10 |
|  |  |  |  |
| c | 789 is divided by 23 | 34 | 7 |
|  |  |  |  |
| d | 1001 is divided by 13 | 77 | 0 |
|  |  |  |  |
| e | 0 is divided by 19 | 0 | 0 |
|  |  |  |  |
| f | 3 is divided by 5? | 0 | 3 |
|  |  |  |  |
| g | −1 is divided by 3? | -1 | 2 |
|  |  |  |  |
| h | 4 is divided by 1? | 4 | 0 |

With these answers, I went into an online calculator and confirmed that these are all the correct answers.

Section 4.2, Number 9

In this question I was asked to convert (ABCDEF)16, from its hexadecimal expansion into its binary expansion.

Pg. 249, Table 1

By using the chart provided in the textbook, the solution can be found by plugging in the needed characters.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Binary | Dec | Hex | Oct |
| Convert (ABCDEF)16 from its hexadecimal expansion to | `0000 | 0 | 0 | 0 |
| its binary expansion. | `0001 | 1 | 1 | 1 |
|  | `0010 | 2 | 2 | 2 |
|  | `0011 | 3 | 3 | 3 |
|  | `0100 | 4 | 4 | 4 |
|  | `0101 | 5 | 5 | 5 |
|  | `0110 | 6 | 6 | 6 |
|  | `0111 | 7 | 7 | 7 |
|  | `1000 | 8 | 8 | 10 |
|  | `1001 | 9 | 9 | 11 |
| A | `1010 | 10 | 10 | 12 |
| B | `1011 | 11 | 11 | 13 |
| C | `1100 | 12 | 12 | 14 |
| D | `1101 | 13 | 13 | 15 |
| E | `1110 | 14 | 14 | 16 |
| F | `1111 | 15 | 15 | 17 |

For this problem I just referenced the table provided in the textbook to confirm that my answer is correct.

Section 4.3, Number 3

In this question I am asked to find the prime factorization of each of the numbers provided.

Pg. 257, “Primes”. Pg. 258, Example 2

Prime factorization is the process of finding which smallest primes can be multiplied by each other and how many times, in order to reach the original number.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| prime factoring |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| 88 |  | 44 | 22 | 11 | 1 |  |  |  |  |
|  |  | 2 | 2 | 2 | 11 |  |  |  |  |
| 126 |  | 63 | 21 | 7 | 1 |  |  |  |  |
|  |  | 2 | 3 | 3 | 7 |  |  |  |  |
| 729 |  | 243 | 81 | 27 | 9 | 3 | 1 |  |  |
|  |  | 3 | 3 | 3 | 3 | 3 | 3 |  |  |
| 1001 |  | 77 | 91 | 143 |  |  |  |  |  |
|  |  | 13 | 11 | 7 |  |  |  |  |  |
| 1111 |  | 101 |  |  |  |  |  |  |  |
|  |  | 11 |  |  |  |  |  |  |  |
| 909,090 |  | 454545 | 151515 | 30303 | 10101 | 3367 | 481 | 37 | 1 |
|  |  | 2 | 3 | 5 | 3 | 3 | 7 | 13 | 37 |

For this problem I was able to reference Example 2 listed above, and work out the problems from that.