MITx 6.004.1x
Computation Structures 1: Digital Circuits

Help

Course   Progress   Dates   Discussion   Course Notes

🏠 Course / 1. Basics of Information / Tutorial Problems

Previous   ✎✔   ✎   ✎   ✎   ✎   Next ›

Tutorial : Two's Complement Representation

🔖 Bookmark this page

Two's Complement Representation

0/1 point (ungraded)
The 8-bit binary two's complement representation for decimal -25 is

- ⦿ 11110110

- ○ 10101111

- ○ 11100111

- ○ -00011001

- ○ None of the above

Submit

Two's Complement Representation

3 points possible (ungraded)
A binary function is a function whose inputs and outputs are binary values (0 or 1). To determine how many binary functions of N inputs there are, you want to consider how many unique functions can be defined for all combinations of those inputs. For example, the AND(A, B) is different from the OR(A, B) because for inputs 01 and 10 the AND function produces a 0 but the OR function produces a 1. This means that AND and OR are two distinct functions of two binary inputs. (Note: there are many more than two distinct functions of two binary inputs).

How many binary functions of two (binary) inputs are there? (You can write your answer in terms of exponents, ex: x^2)   [16]   Answer: 16

Explanation
A binary function is a function that takes its inputs and outputs in binary. If the function has two inputs, that means there are 2^2 possible input combinations and thus 2^2 possible outputs corresponding to those inputs. Each **set** of these 4 outputs corresponds to a binary function, so there are 2^4 possible binary functions of two inputs, one for each possible output combination.

How many binary functions of 3 (binary) inputs are there? (You can write your answer in terms of exponents, ex: x^2)   [256]   Answer: 2^(2^3)

Explanation
If the function has 3 inputs, that means there are 2^3 possible input combinations and thus 2^3 possible outputs corresponding to those inputs. Each **set** of these outputs corresponds to a binary function, so there are 2^{2^3} possible binary functions of 3 inputs, one for each possible output combination.

Ternary logic functions use 3-valued logic. How many ternary functions of 4 (ternary) inputs are there? (You can write your answer in terms of exponents, ex: x^2 or x^(y^2))   [3^((3^4))]   Answer: 3^(3^4)

Explanation
Ternary functions have inputs and outputs that are represented in 3-value logic (i.e. 0, 1/2 and 1). If the function has 4 inputs, that means there are 3^4 possible input combinations and thus 3^4 possible outputs corresponding to those inputs. Each **set** of these outputs corresponds to a ternary function, so there are 3^{3^4} possible ternary functions of 4 inputs, one for each possible output combination.

Submit

🖩 Calculator

🛈   Answers are displayed within the problem

Two's Complement Representation

2 points possible (ungraded)

What decimal integer is represented by the 5-bit two's complement binary number 00101?

What decimal integer is represented by the 5-bit two's complement binary number 11010?

Submit

Two's Complement Representation

3 points possible (ungraded)

Using a 5-bit two's complement representation, what is the range of integers that can be represented with a single 5-bit quantity?

Range of integers: min   max

Consider the following subtraction problem where the operands are 5-bit two's complement numbers. Compute the result and give the answer as a decimal (base 10) number.

```
    10111
  - 00100
```

Answer in decimal (base 10):

Submit

Discussion   **Hide Discussion**

Topic: 1. Basics of Information / Tutorial : Two's Complement Representation

Add a Post

Show all posts ⌄	by recent activity ⌄

💬 **Incorrect Answer for "How many binary functions of 3 (binary) inputs are there?"** First let's assume it has 3 inputs and 3 outputs. Though number of outputs are not specified looking as the approach in other questi...	5
❓ **could not format the html** why the html formated after completing the quiz	2
💬 **Two's Complement Representation and How many binary functions of two (binary) inputs are there?** Am I missing something or there was no mention for counting possible functions problem in the lections or somewhere before? This...	3
☑ **Binary Function** What does this explanation mean: Each set of these 4 outputs corresponds to a binary function, so there are 2^4 possible binary fu...	8
☑ **Typo**	2
💬 **Help: Binary Functions & Two's Complement Representation** Some questions such as the following were brought up in the "Tutorial Problems" section of Chapter 1 (Basics of Information): > Ho...	

🖩 Calculator

💬 **"Single-valued function of single-bit binary values" seems a better definition.**   1

For example in addition of multibit binary numbers; total 3 binary values) enter the operation and 2 bit values are produced for ever...

‹ Previous	Next ›

edX

edX

About

Affiliates

edX for Business

Open edX

Careers

News

Legal

Terms of Service & Honor Code

Privacy Policy

Accessibility Policy

Trademark Policy

Sitemap

Cookie Policy

Your Privacy Choices

Connect

Idea Hub

Contact Us

Help Center

Security

Media Kit

Calculator