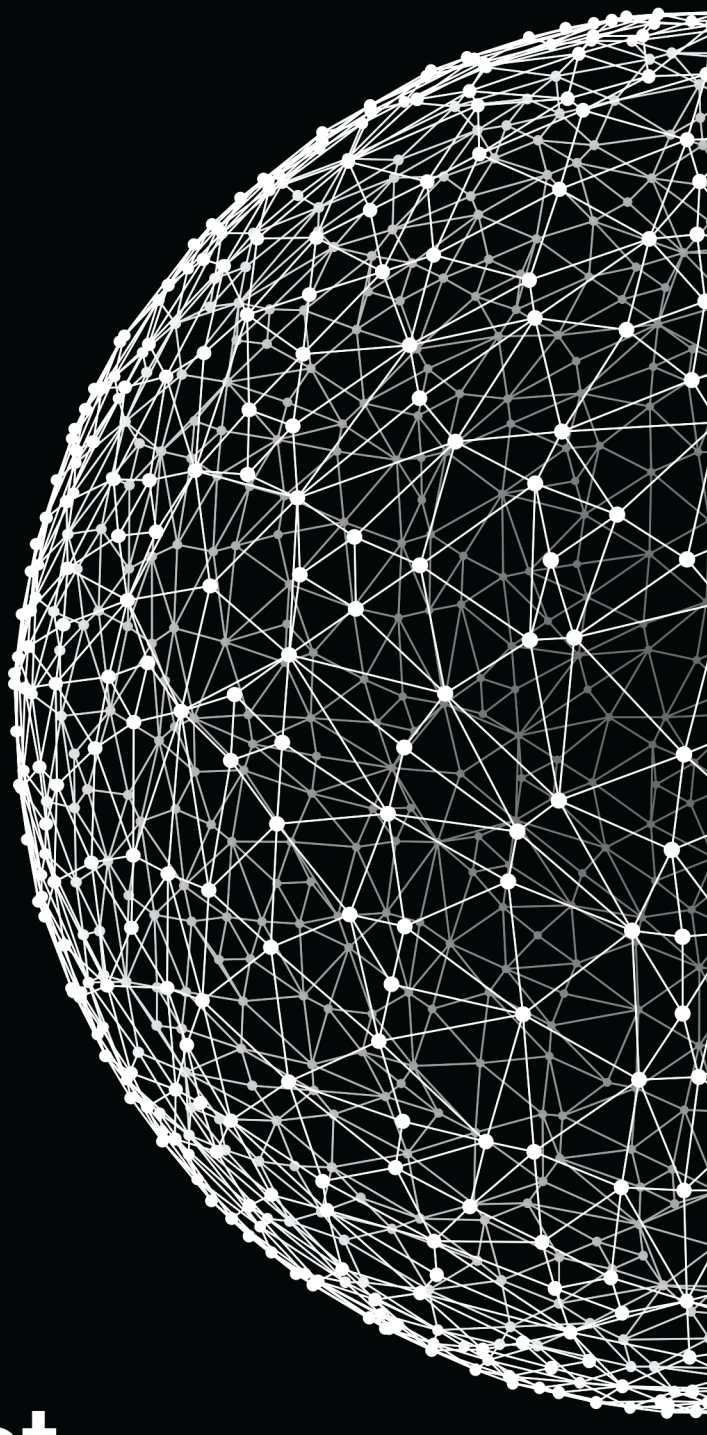
Sprint 02

Marathon C

September 3, 2020



ucode connect

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ucode connect

Engage

DESCRIPTION

Ah C, here we go again.

We hope that your first acquaintance with the C language was successful.

Using standard functions makes writing code easier. However, we believe that it's better to discover how they work by writing the algorithms behind common simple function yourself.

Imagine how great it is to understand why a particular function works in a certain way.

In this Sprint, you will rewrite some standard functions and implement the basics of mathematics in C.

BIG IDEA

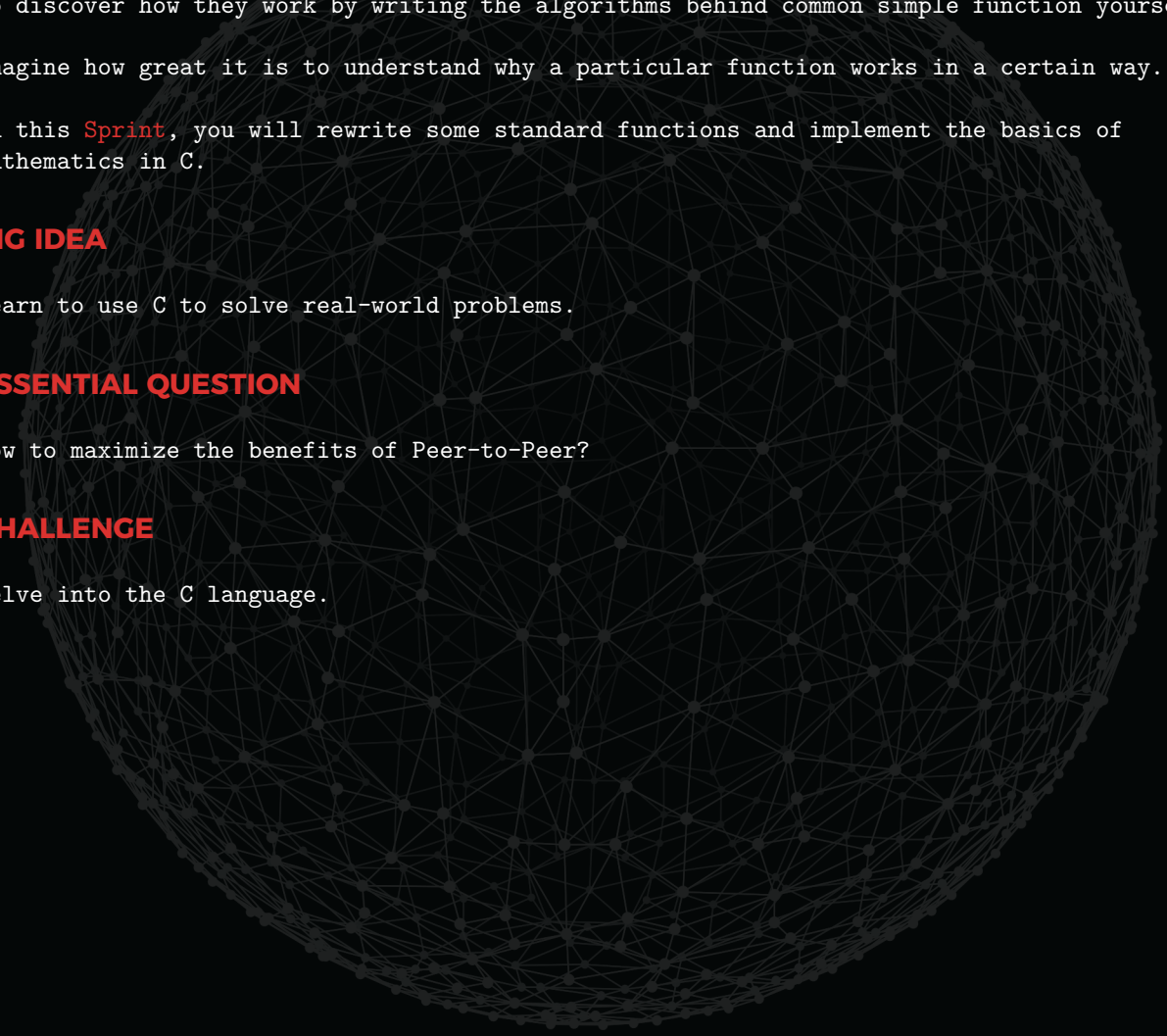
Learn to use C to solve real-world problems.

ESSENTIAL QUESTION

How to maximize the benefits of Peer-to-Peer?

CHALLENGE

Delve into the C language.



Investigate

GUIDING QUESTIONS

We invite you to find answers to the following questions. By researching and answering them, you will gain the knowledge necessary to complete the challenge. To find answers, ask the students around you and search the internet. We encourage you to ask as many questions as possible. Note down your findings and discuss them with your peers.

- Do you like C?
- How was the last Sprint? How many tasks have you completed?
- What topics were unclear to you?
- What is a function? What is a loop?
- How to use standard functions?
- Do you know what standard output is?
- How to print text to the console?
- How many letters are there in the English alphabet?
- What is the difference between a digit and a number?

GUIDING ACTIVITIES

Complete the following activities. Don't forget that you have a limited time to overcome the challenge. Use it wisely. Distribute tasks correctly.

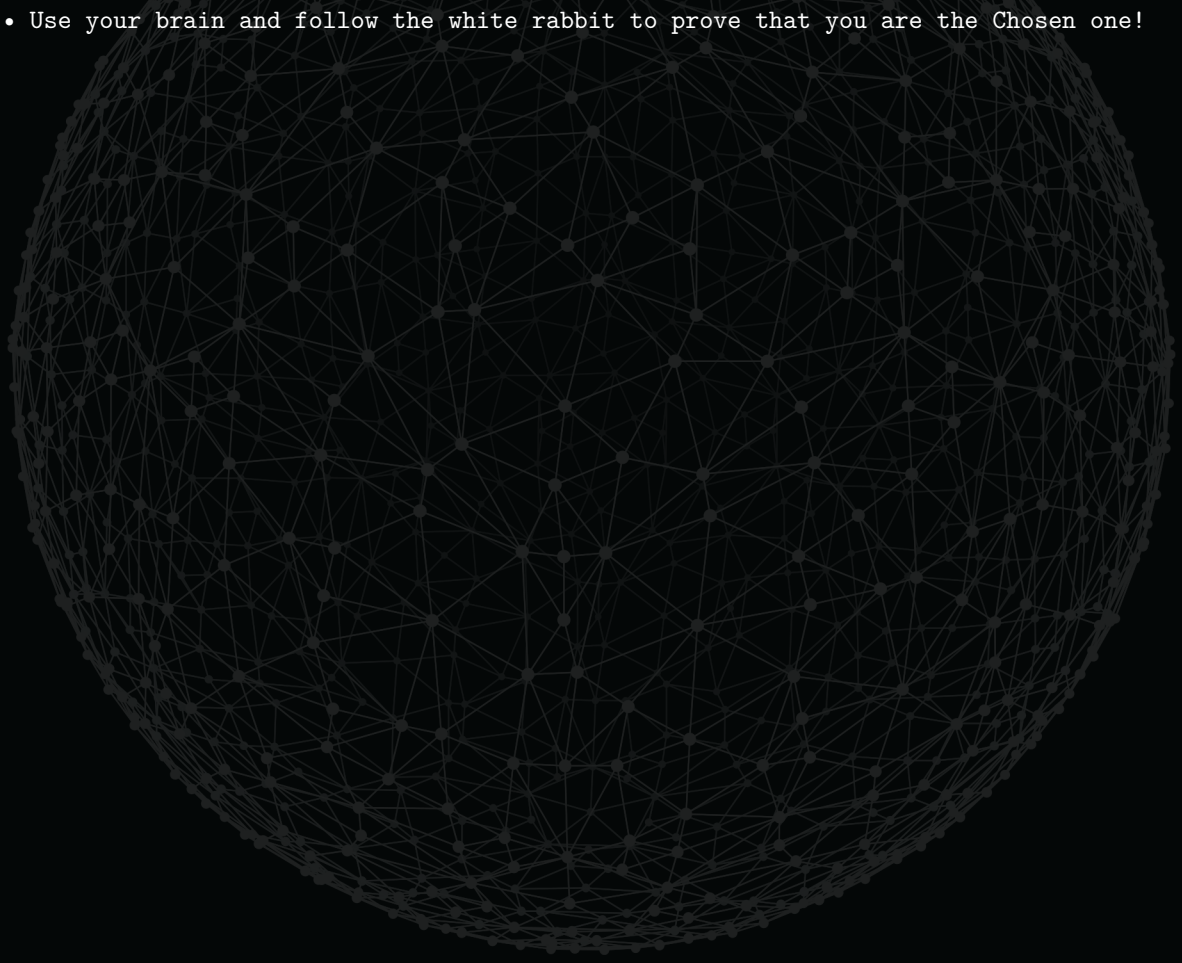
- Repeat the basics from the previous challenges. Try to output your name to the standard output using C. And also using the Unix command.
- Try to compile the written code and run your program. Does it work as you expected?
- Use some standard functions. Just for fun. Try to use `getchar`, `gets` and `puts`.
- Clone your git repository that is issued on the challenge page in the LMS. Use `git clone` for this.
- Open the story and read it!
- Arrange to brainstorm tasks with other students.
- Try to implement your thoughts in code.

ANALYSIS

Analyze your findings. What conclusions have you made after completing guiding questions and activities? In addition to your thoughts and conclusions, here are some more analysis results.

- Be attentive to all statements of the story. Examine the given examples carefully. They may contain details that are not mentioned in the task.
- Perform only those tasks that are given in this document.
- Submit your files using the layout described in the story. Only useful files allowed, garbage shall not pass!

- Compile C-files with clang compiler and use these flags: `clang -std=c11 -Wall -Wextra -Werror -Wpedantic`.
- Pay attention to what is allowed in a certain task. Use of forbidden stuff is considered a cheat and your tasks will be failed.
- Complete tasks according to the rules specified in the `Auditor`.
- The solution will be checked and graded by students like you. Peer-to-Peer learning.
- Also, the challenge will pass automatic evaluation which is called `Oracle`.
- If you have any questions or don't understand something, ask other students or just Google it.
- Use your brain and follow the white rabbit to prove that you are the Chosen one!



Act: Task 00

NAME

Positive or negative

DIRECTORY

`t00/`

SUBMIT

`mx_is_positive.c, mx_printstr.c, mx_strlen.c`

ALLOWED FUNCTIONS

`write`

DESCRIPTION

Create a function that outputs `positive`, `negative` or `zero` followed by a newline to the standard output whether number is positive, negative or equal to 0.

SYNOPSIS

```
void mx_is_positive(int i);
```

EXAMPLE

```
mx_is_positive(2); //prints positive
```

FOLLOW THE WHITE RABBIT

`man 2 write`

Act: Task 01

NAME

Odd or even

DIRECTORY

`t01/`

SUBMIT

`mx_is_odd.c`

ALLOWED FUNCTIONS

None

DESCRIPTION

Create a function that checks whether a number is odd or even.

RETURN

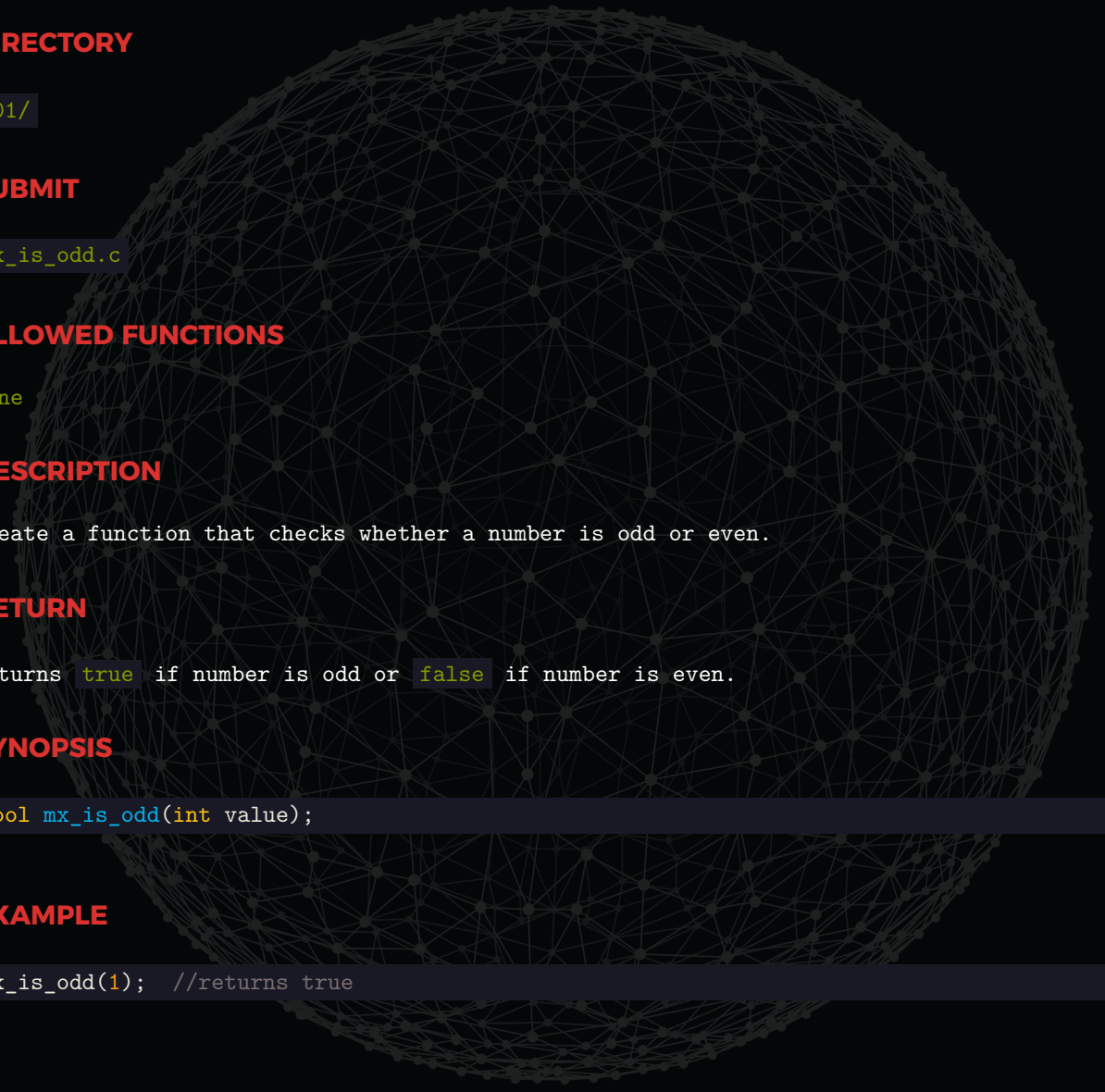
Returns `true` if number is odd or `false` if number is even.

SYNOPSIS

```
bool mx_is_odd(int value);
```

EXAMPLE

```
mx_is_odd(1);  //returns true
```



Act: Task 02

NAME

Is alphabetic?

DIRECTORY

`t02/`

SUBMIT

`mx_isalpha.c`

ALLOWED FUNCTIONS

None

DESCRIPTION

Create a function that has the same behaviour as the standard libc function `isalpha`.

SYNOPSIS

```
bool mx_isalpha(int c);
```

EXAMPLE

```
mx_isalpha('a');  //returns 1
```

FOLLOW THE WHITE RABBIT

`man isalpha`

Act: Task 03

NAME

Is digit?

DIRECTORY

`t03/`

SUBMIT

`mx_isdigit.c`

ALLOWED FUNCTIONS

None

DESCRIPTION

Create a function that has the same behaviour as the standard libc function `isdigit`.

SYNOPSIS

```
bool mx_isdigit(int c);
```

EXAMPLE

```
mx_isdigit('A');  //returns 0
```

FOLLOW THE WHITE RABBIT

`man isdigit`

Act: Task 04

NAME

Is white-space?

DIRECTORY

`t04/`

SUBMIT

`mx_isspace.c`

ALLOWED FUNCTIONS

None

DESCRIPTION

Create a function that has the same behaviour as the standard libc function `isspace`.

SYNOPSIS

```
bool mx_isspace(char c);
```

EXAMPLE

```
mx_isspace(' ');  //returns 1
```

FOLLOW THE WHITE RABBIT

`man isspace`

SEE ALSO

Whitespace character

Act: Task 05

NAME

Is lower case?

DIRECTORY

`t05/`

SUBMIT

`mx_islower.c`

ALLOWED FUNCTIONS

None

DESCRIPTION

Create a function that has the same behaviour as the standard libc function `islower`.

SYNOPSIS

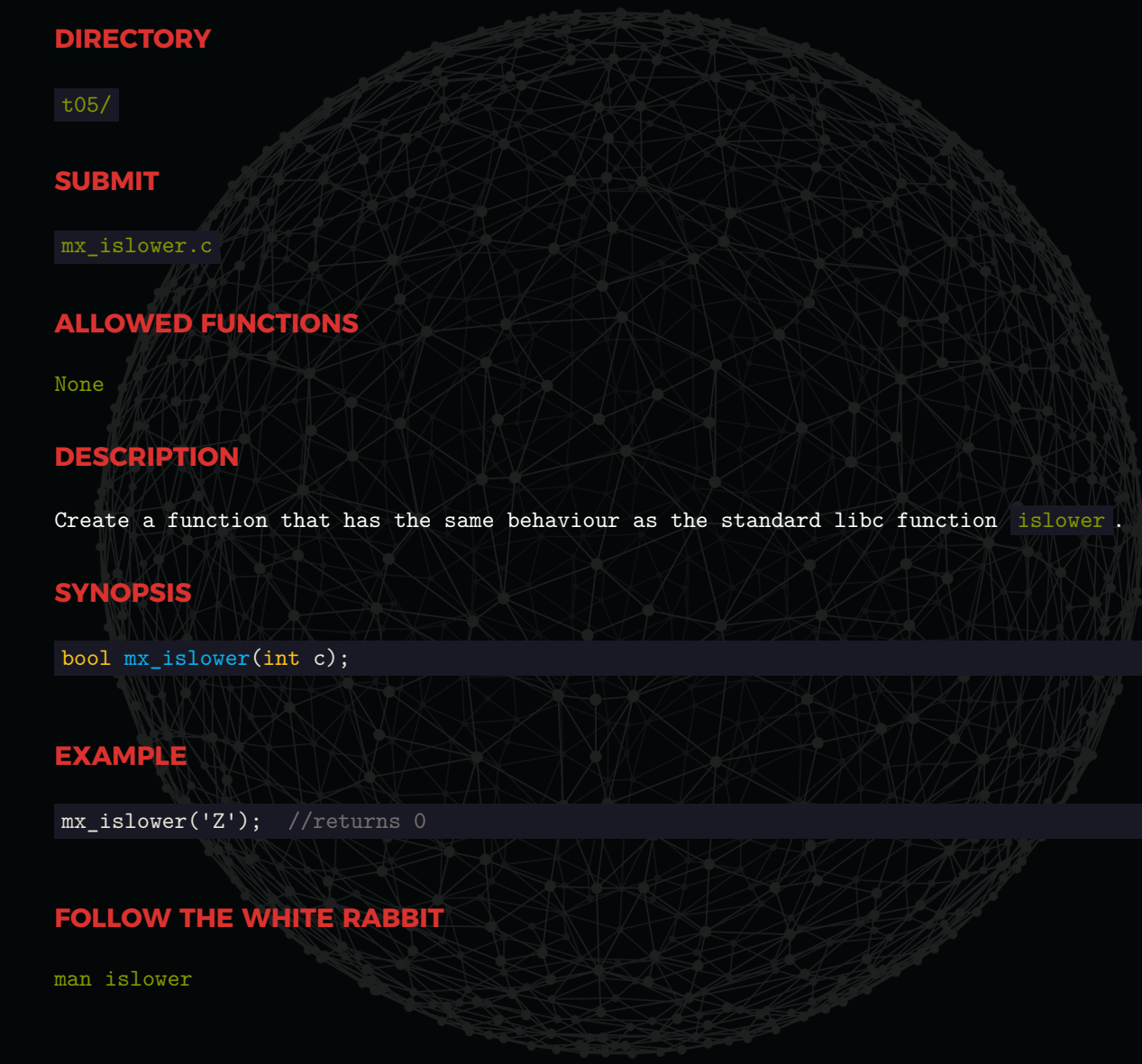
```
bool mx_islower(int c);
```

EXAMPLE

```
mx_islower('Z');  //returns 0
```

FOLLOW THE WHITE RABBIT

`man islower`



Act: Task 06

NAME

Is upper case?

DIRECTORY

`t06/`

SUBMIT

`mx_isupper.c`

ALLOWED FUNCTIONS

None

DESCRIPTION

Create a function that has the same behaviour as the standard libc function `isupper`.

SYNOPSIS

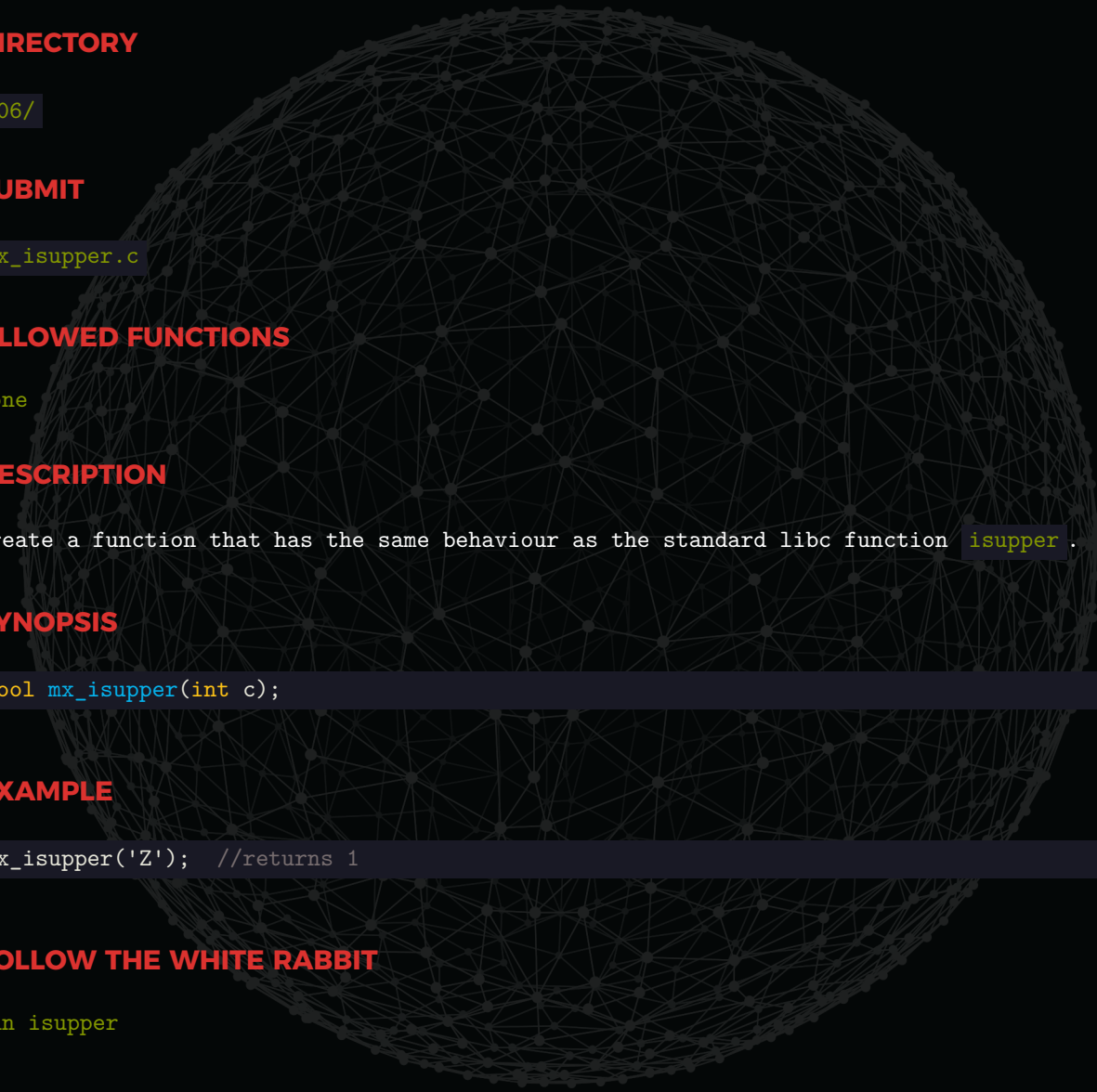
```
bool mx_isupper(int c);
```

EXAMPLE

```
mx_isupper('Z');  //returns 1
```

FOLLOW THE WHITE RABBIT

`man isupper`



Act: Task 07

NAME

To lower case

DIRECTORY

`t07/`

SUBMIT

`mx_tolower.c`

ALLOWED FUNCTIONS

None

DESCRIPTION

Create a function that has the same behaviour as the standard libc function `tolower`.

SYNOPSIS

```
int mx_tolower(int c);
```

EXAMPLE

```
mx_tolower('Z');  //returns z
mx_tolower('z');  //returns z
```

FOLLOW THE WHITE RABBIT

`man tolower`

Act: Task 08

NAME

To upper case

DIRECTORY

`t08/`

SUBMIT

`mx_toupper.c`

ALLOWED FUNCTIONS

None

DESCRIPTION

Create a function that has the same behaviour as the standard libc function `toupper`.

SYNOPSIS

```
int mx_toupper(int c);
```

EXAMPLE

```
mx_toupper('Z');  //returns Z
mx_toupper('z');  //returns Z
```

FOLLOW THE WHITE RABBIT

`man toupper`

Act: Task 09

NAME

Isosceles triangle

DIRECTORY

`t09/`

SUBMIT

`mx_isos_triangle.c, mx_printchar.c`

ALLOWED FUNCTIONS

`write`

DESCRIPTION

Create a function that outputs to the standard output an isosceles triangle:

- with a given triangle side length and a character to fill the figure
- each row must be followed by a newline

SYNOPSIS

```
void mx_isos_triangle(unsigned int length, char c);
```

CONSOLE OUTPUT

```
>./mx_isos_triangle | cat -e    # for mx_isos_triangle(3, '*');
*$
**$
***$
>
```

Act: Task 10

NAME

Multiple of a number

DIRECTORY

`t10/`

SUBMIT

`mx_multiple_number.c`

ALLOWED FUNCTIONS

None

DESCRIPTION

Create a function that checks whether a natural number `mult` is a multiple of a number `n`.

RETURN

Returns `true` if the number `mult` is the multiple of the number `n`, otherwise `false`.

SYNOPSIS

```
bool mx_multiple_number(int n, int mult);
```

EXAMPLE

```
mx_multiple_number(3, 9); //returns true
```

Act: Task 11

NAME

Find maximum

DIRECTORY

`t11/`

SUBMIT

`mx_max.c`

ALLOWED FUNCTIONS

None

DESCRIPTION

Create a function that finds the largest number among options.

RETURN

Returns value of the maximum number.

SYNOPSIS

```c
int mx_max(int a, int b, int c);
```

EXAMPLE

```c
mx_max(-1, 0, 1); //returns 1
```

Act: Task 12

NAME

Middle number

DIRECTORY

`t12/`

SUBMIT

`mx_mid.c`

ALLOWED FUNCTIONS

None

DESCRIPTION

Create a function that finds the "middle number" among options - the median.

RETURN

Returns value of the middle number.

SYNOPSIS

```c
int mx_mid(int a, int b, int c);
```

EXAMPLE

```c
mx_mid(5, 16, 10); //returns 10
mx_mid(5, 6, 6); //returns 6
```

Act: Task 13

NAME

Sum digits

DIRECTORY

`t13/`

SUBMIT

`mx_sum_digits.c`

ALLOWED FUNCTIONS

None

DESCRIPTION

Create a function that sums up all digits of a number.

RETURN

Returns the sum of all digits of the number.

SYNOPSIS

```
int mx_sum_digits(int num);
```

EXAMPLE

```
mx_sum_digits(435); //returns 12
mx_sum_digits(-555); //returns 15
```

Act: Task 14

NAME

Print integer

DIRECTORY

`t14/`

SUBMIT

`mx_printint.c, mx_printchar.c`

ALLOWED FUNCTIONS

`write`

DESCRIPTION

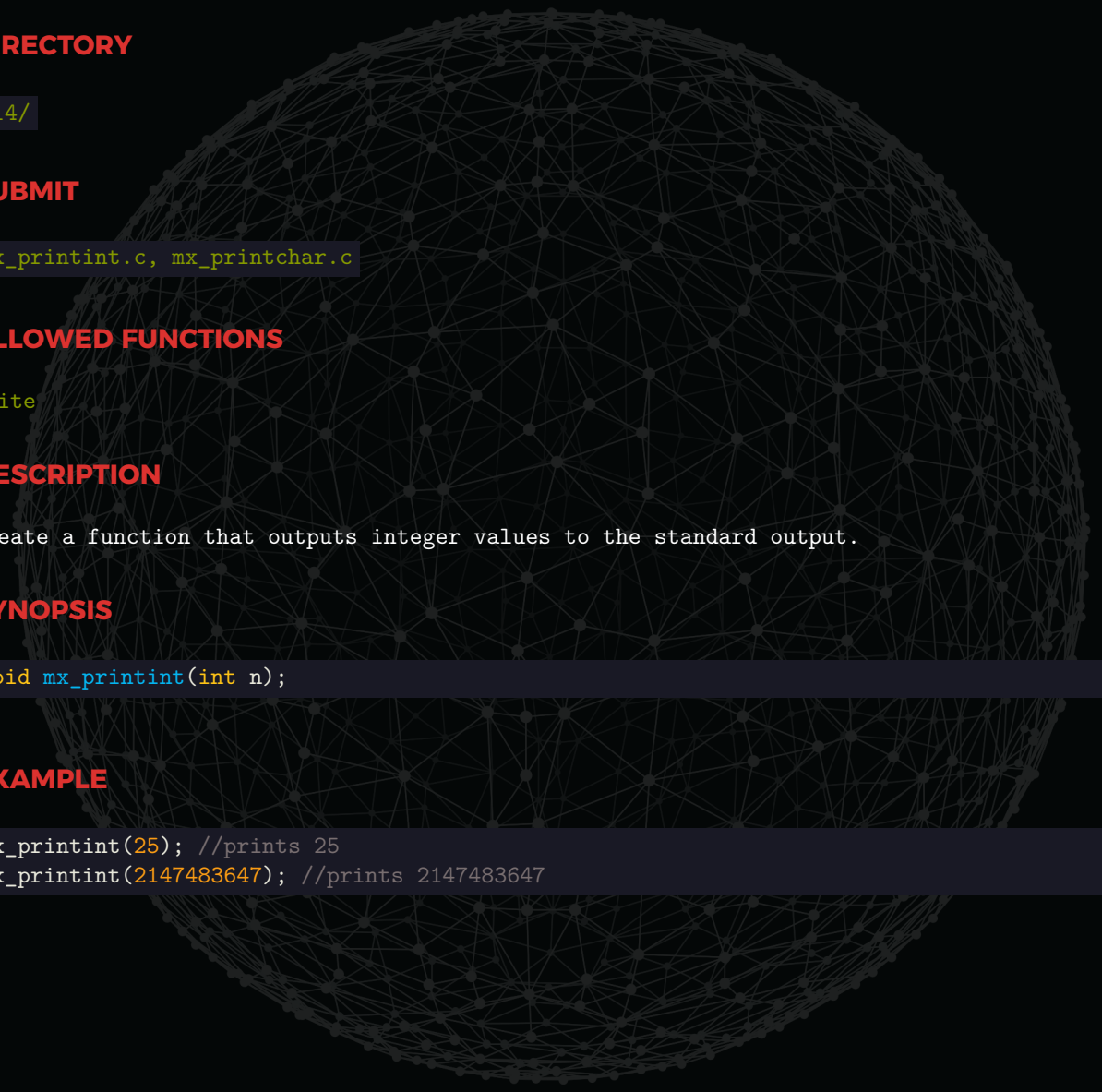
Create a function that outputs integer values to the standard output.

SYNOPSIS

```
void mx_printint(int n);
```

EXAMPLE

```
mx_printint(25); //prints 25
mx_printint(2147483647); //prints 2147483647
```



Share

PUBLISHING

Last but not least, the final stage of your work is to publish it. This allows you to share your challenges, solutions, and reflections with local and global audiences. During this stage, you will discover ways of getting external evaluation and feedback on your work. As a result, you will get the most out of the challenge, and get a better understanding of both your achievements and missteps.

To share your work, you can create:

- a text post, as a summary of your reflection
- charts, infographics or other ways to visualize your information
- a video, either of your work, or a reflection video
- an audio podcast. Record a story about your experience
- a photo report with a small post

Helpful tools:

- Canva - a good way to visualize your data
- QuickTime - an easy way to capture your screen, record video or audio

Examples of ways to share your experience:

- Facebook - create and share a post that will inspire your friends
- YouTube - upload an exciting video
- GitHub - share and describe your solution
- Telegraph - create a post that you can easily share on Telegram
- Instagram - share photos and stories from ucode. Don't forget to tag us :)

Share what you've learned and accomplished with your local community and the world. Use #ucode and #CBLWorld on social media.