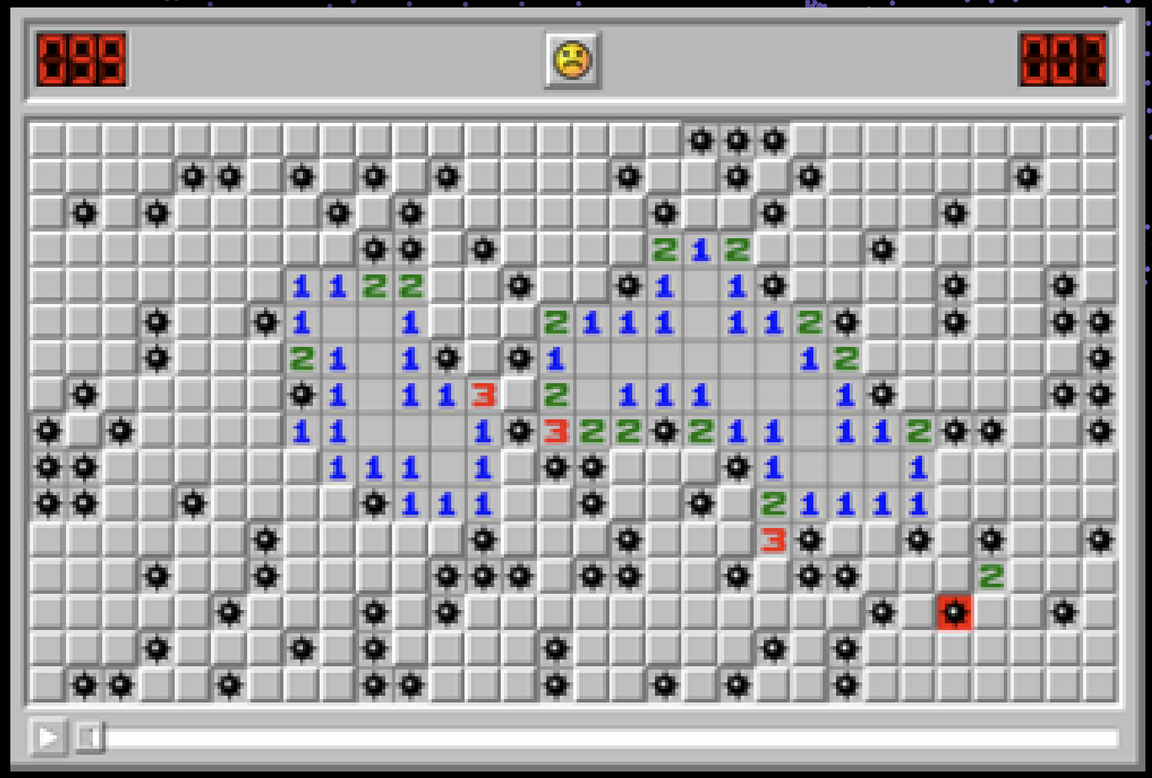
COMP1511 ASSIGNMENT 1

Minesweeper

Due: **8pm, 9 July**

Objective: build the game

Aim of the game: reveal all squares in the grid that do not have a mine

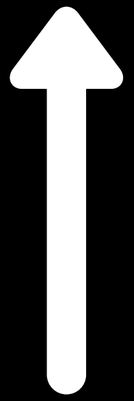


What you'll implement:

- placing mines
- detecting mines
- revealing parts of the grid
- debug and non-debug modes
- flagging mines (ext)
- defusing mines (ext)

What is the minefield?

```
int array_1D[SIZE] = {0, 0, 0, 0, 0, 0, 0, 0};
```



Arrays are a collection of the same type of variable

Minefield is just a 2D array;
an array of arrays

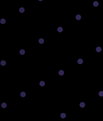
```
    int array_2D[ROWS][COLS] = {

// col   0  1  2  3  4  5  6  7
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 0
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 1
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 2
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 3
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 4
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 5
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 6
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 7

    };
```

Accessing the minefield

```
int array_1D[SIZE] = {0, 0, 0, 0, 0, 0, 0, 0};
```

What is 'i' ?
array_1D[i]

What are 'i' and 'j' ?
array_2D[i] [j]



```
    int array_2D[ROWS][COLS] = {

// col   0  1  2  3  4  5  6  7
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 0
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 1
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 2
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 3
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 4
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 5
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 6
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 7

    };
```

Accessing the minefield

```
int array_1D[SIZE] = {0, 0, 0, 0, 0, 0, 0, 0};
```

array_1d[2]

array_2D[4][2]

```
    int array_2D[ROWS][COLS] = {

// col   0  1  2  3  4  5  6  7
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 0
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 1
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 2
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 3
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 4
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 5
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 6
        {0, 0, 0, 0, 0, 0, 0, 0}, // row 7

    };
```

Increasing the stakes:
https://playtictactoe.org/

Reference implementation

1511 minesweeper

Stage 1

Placing mines:

on initialisation

Detecting mines in a row:

command = 1 [row] [column] [length]

Possible states for squares:

VISIBLE_SAFE: 0 HIDDEN_SAFE: 1 HIDDEN_MINE: 2

Stage 2

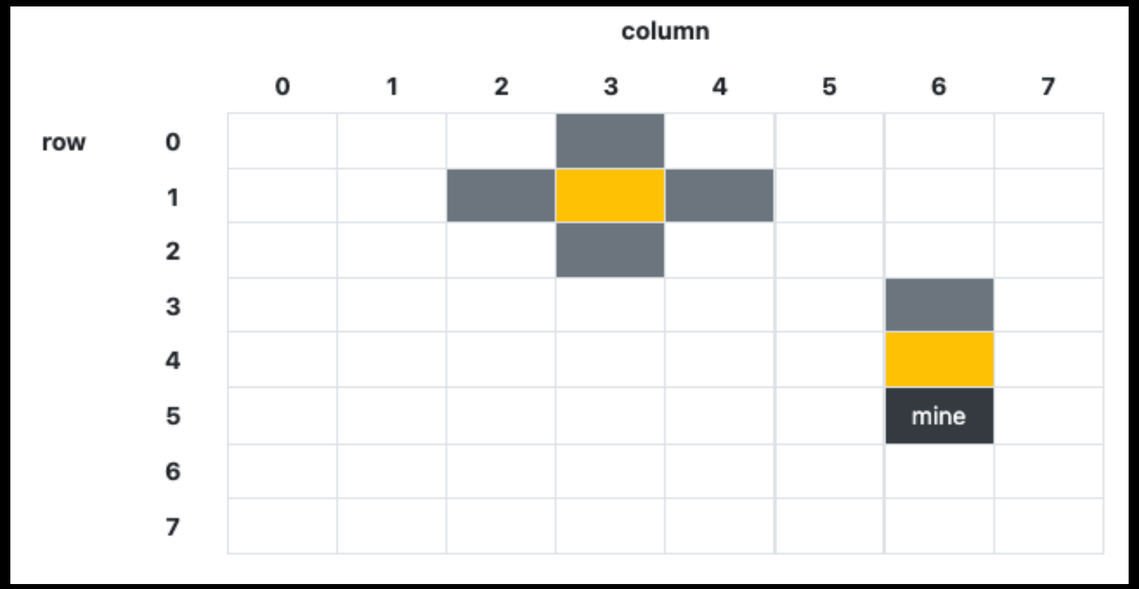
Detecting mines in a square:

command = 2 [row] [column] [size]

		column							
		0	1	2	3	4	5	6	7
row	0	(0,0)	(0,1)	(0,2)	(0,3)	(0,4)	(0,5)	(0,6)	(0,7)
	1	(1,0)	(1,1)	(1,2)	(1,3)	(1,4)	(1,5)	(1,6)	(1,7)
	2	(2,0)	(2,1)	(2,2)	(2,3)	(2,4)	(2,5)	(2,6)	(2,7)
	3	(3,0)	(3,1)	(3,2)	(3,3)	(3,4)	(3,5)	(3,6)	(3,7)
	4	(4,0)	(4,1)	(4,2)	(4,3)	(4,4)	(4,5)	(4,6)	(4,7)
	5	(5,0)	(5,1)	(5,2)	(5,3)	(5,4)	(5,5)	(5,6)	(5,7)
	6	(6,0)	(6,1)	(6,2)	(6,3)	(6,4)	(6,5)	(6,6)	(6,7)
	7	(7,0)	(7,1)	(7,2)	(7,3)	(7,4)	(7,5)	(7,6)	(7,7)

Reveal cross:

command = 3 [row] [column]



Stage 3

Limited hints:

no command

Debug vs. game mode:

command = 4

side note: which game am I from?

debug mode

```
2 1 1 1 1 1 1 1
1 2 1 1 1 1 1 1
1 2 0 0 1 1 1 1
1 1 0 0 1 1 1 1
1 1 0 1 1 1 1 1
1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1
```

game mode

```
..
\/
    00 01 02 03 04 05 06 07
   ------------------------
00 |## ## ## ## ## ## ## ##|
01 |## ## ## ## ## ## ## ##|
02 |## ## 02    ## ## ## ##|
03 |## ## 01    ## ## ## ##|
04 |## ##    ## ## ## ## ##|
05 |## ## ## ## ## ## ## ##|
06 |## ## ## ## ## ## ## ##|
07 |## ## ## ## ## ## ## ##|
   ------------------------
```

Extension

Before doing stages 4 & 5, ensure that:

- Your code has at least 5 of your own functions
- Your functions must be less than 100 lines
- Your code must pass 1511 style
- All normal lab exercises are complete

In addition to the .c program, you must also submit:

- Description of the work you have done (~ 100 words)
- Two of your own test cases for each extension

See spec for full requirements

Stage 4 & 5 - Extension

Flag mines:

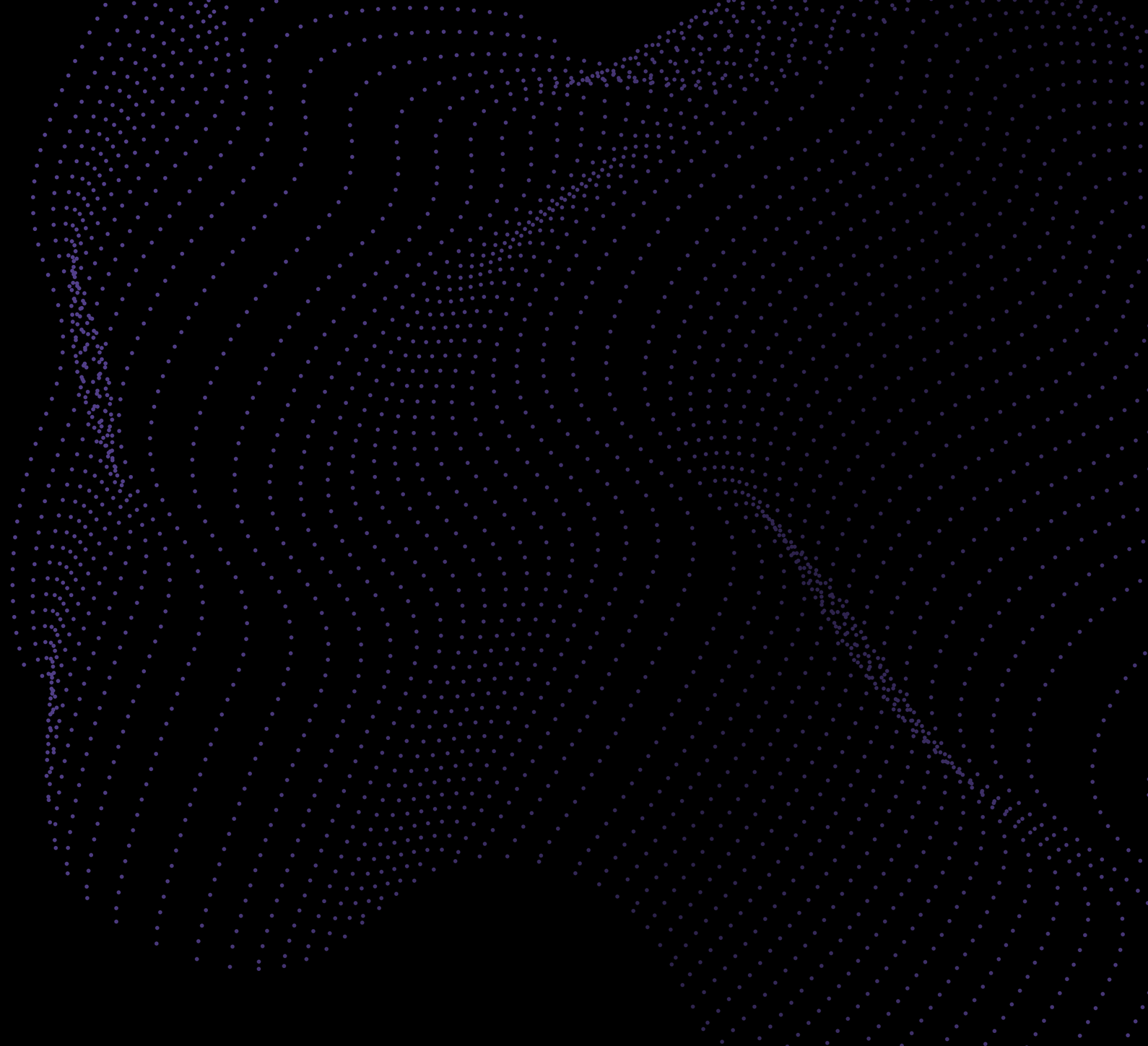
command = 5 [row] [col]

Defuse mines:

command = 6

1511 minesweeper_ext

Starter code



Marks

Extension		Core	
Flag Mines	**Defuse**	**Performance**	**Style**
10%	10%	65%	15%
Worth 15% of course mark			

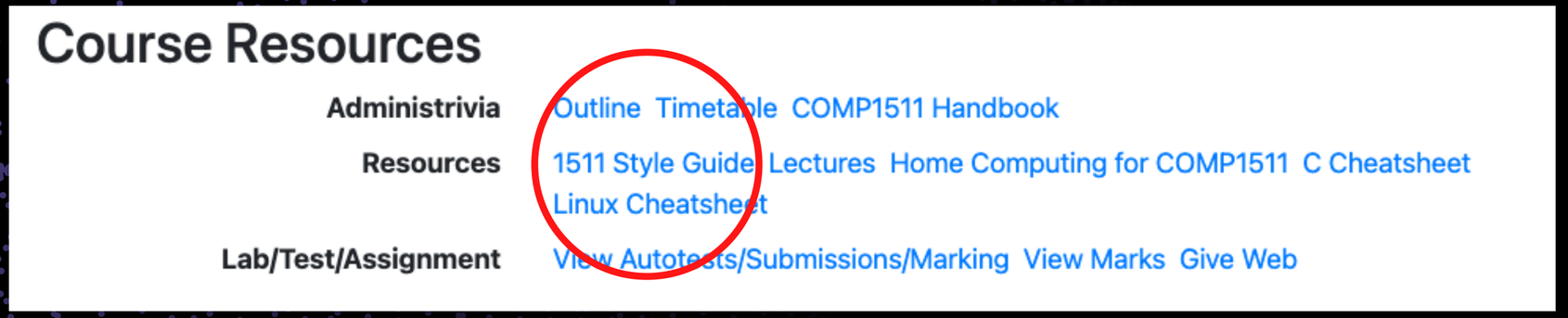
Stages 4 & 5:

- code must pass qualification tests & requirements
- marks awarded based on how many tests written by other students you pass
- any marks lost from other students' tests can be made up for by writing tests that other students fail

Style

Do not just rely on *1511 style*!

Your program should be clear and easy to understand



Headers

Headers should include:

- your zID
- date written
- overview of program, including any bugs or limitations
- any other information to help the reader understand the code
- references to any resources used

```
1   //
2   // COMP1511 Assignment 1 - Minesweeper
3   //
4   // [description of program]
5   //
6   // [additional info]
7   //
8   // Author: zXXXXXXX
9   //
10  // Date: XX/XX/XXXX
11  //
```

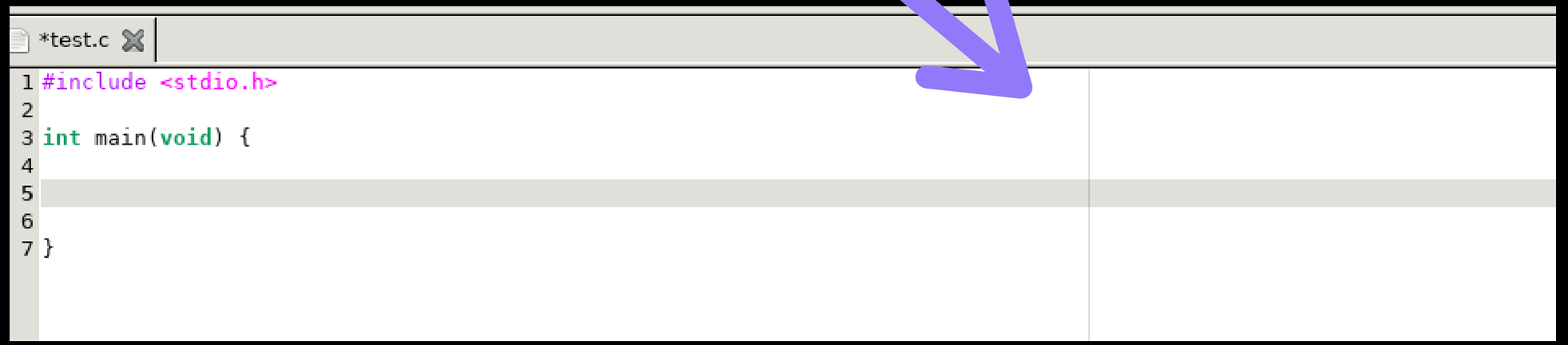
```
60  // [describe what function does]
61  int do_something(int row, int col) {
62
63  }
```

Use comments (in moderation)

Line width: 80 chars

this line is just way way way way way way way way way way way way way way way way too long

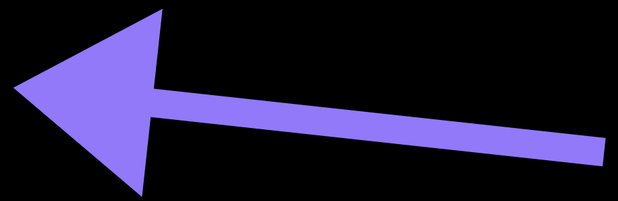
In gedit, use this grey line as a guide:



Indentation

Bad

```
27      if(mark<50){
28      printf(":-(\n");
29  }
30      else{
31      printf(":-)\n");
32      }
```



I made at least 5 style mistakes

Indentation

Bad

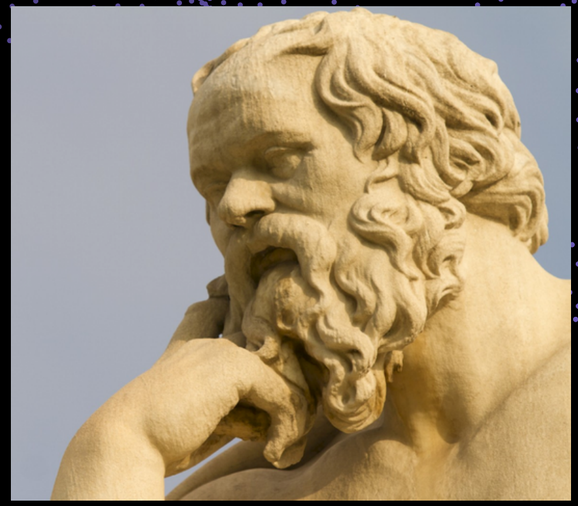
```
27      if(mark<50){
28      printf(":-(\n");
29  }
30      else{
31      printf(":-)\n");
32      }
```

Good

```
27      if (mark < 50) {
28          printf(":-(\n");
29      } else {
30          printf(":-)\n");
31      }
```

Functions

"Functions should do one thing, and one thing only." Socrates



Try to keep functions no longer than 20 lines

Function prototypes / signatures at the top, in the same order as their implementations

```
29
30  void initialise_field(int minefield[SIZE][SIZE]);
31  void print_debug_minefield(int minefield[SIZE][SIZE]);
32
33  // Place your function prototyes here.
34
35  int main(void) {
36      int minefield[SIZE][SIZE];
```

Avoid duplicating code. Use functions instead.
less work = good

Where to get help?

This is an **individual assignment**

- Don't show other students your code
- Don't post it publicly, even after the assignment is done

Help sessions

Livestream recorded on Tuesday

Course forum

Ask us!