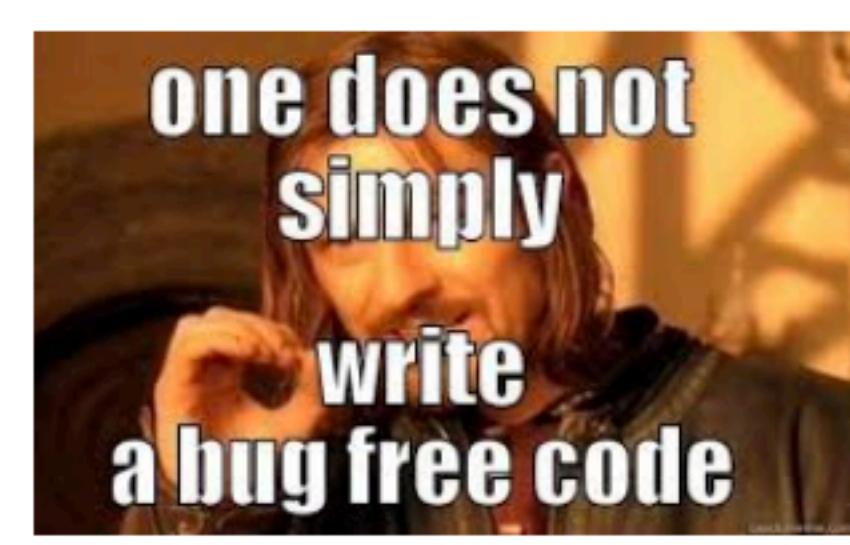
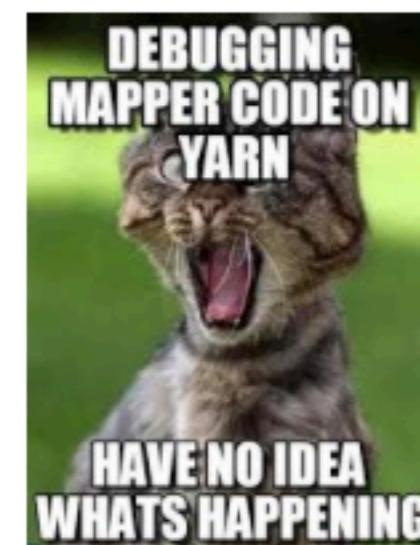
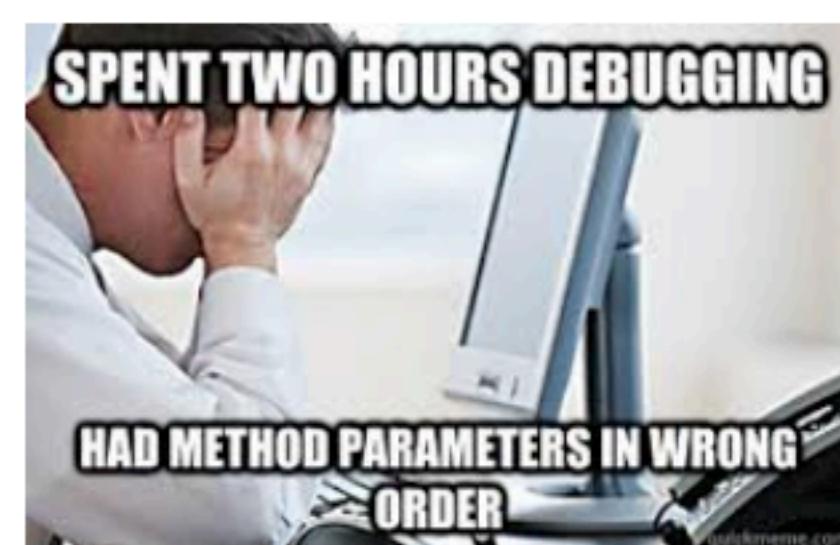
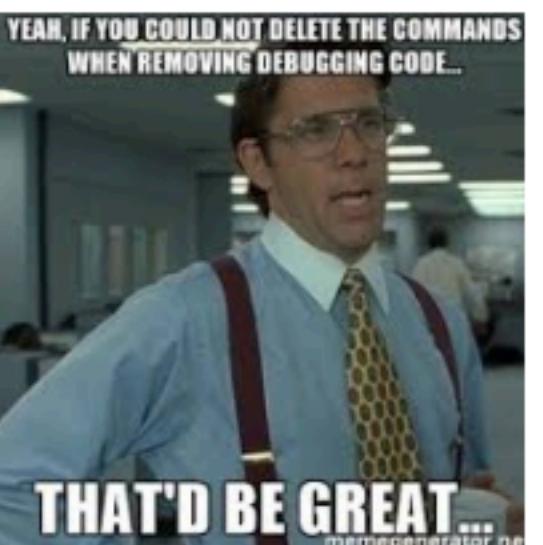
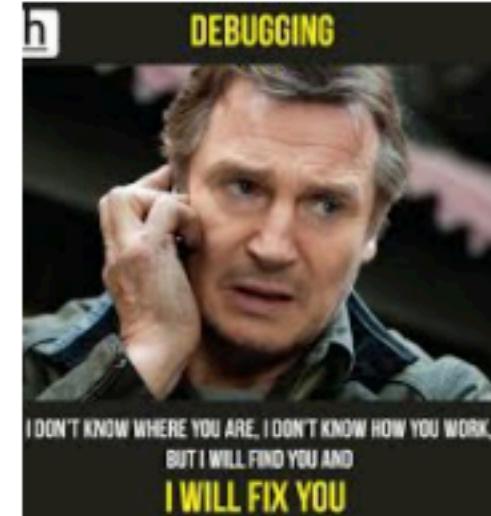
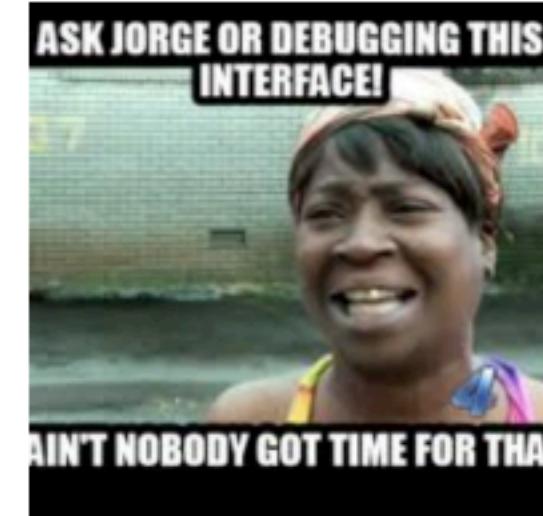
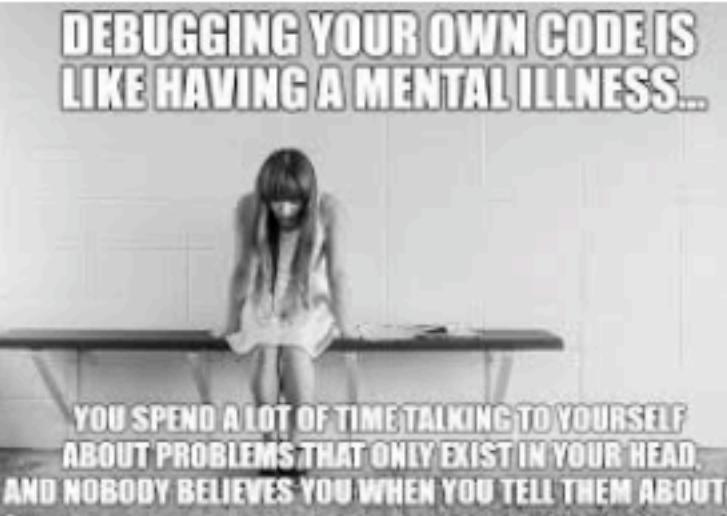
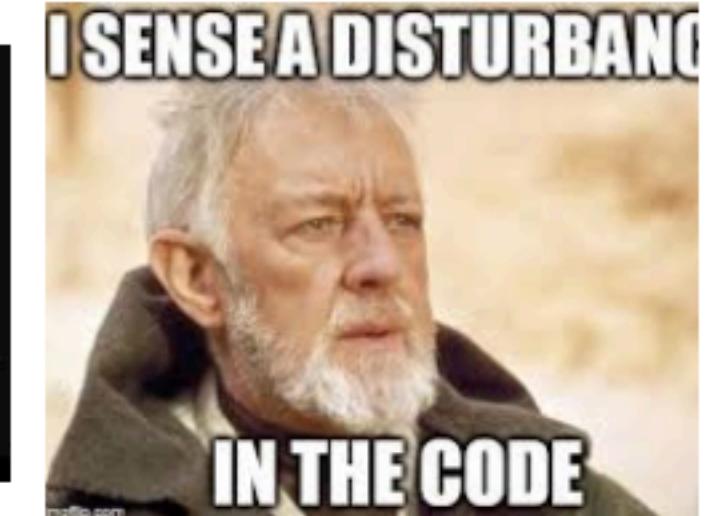
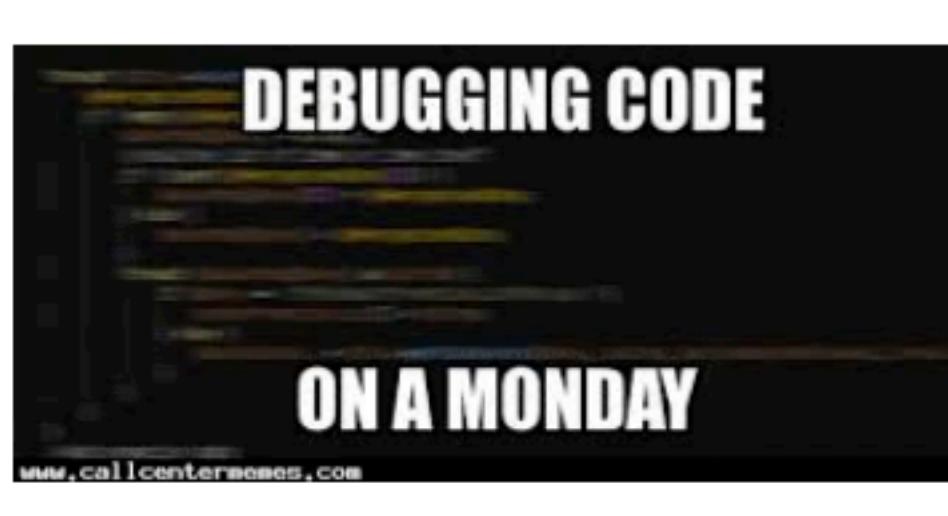
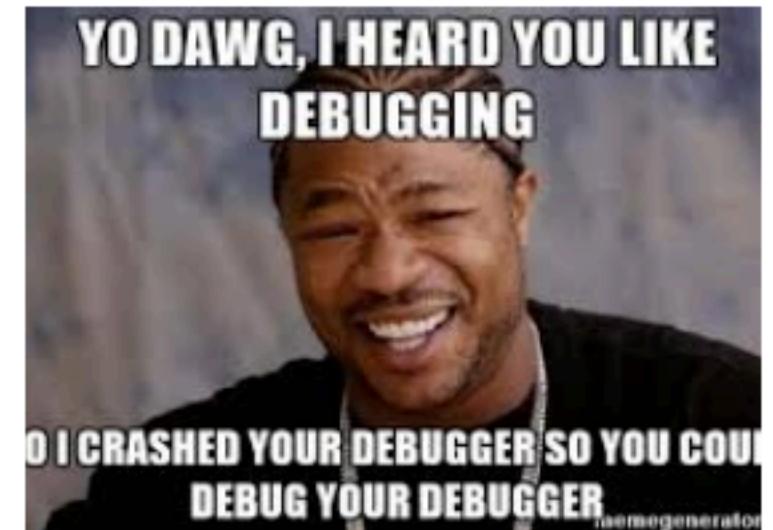
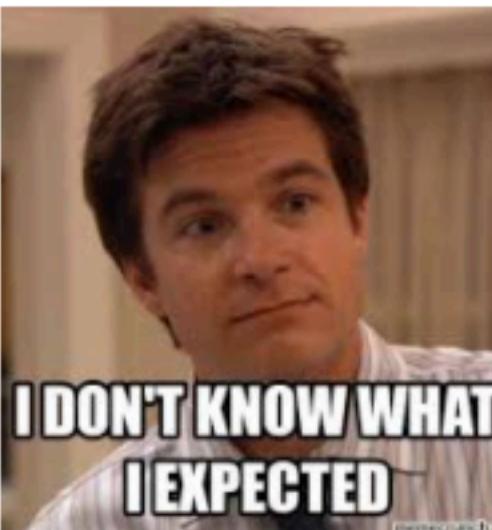
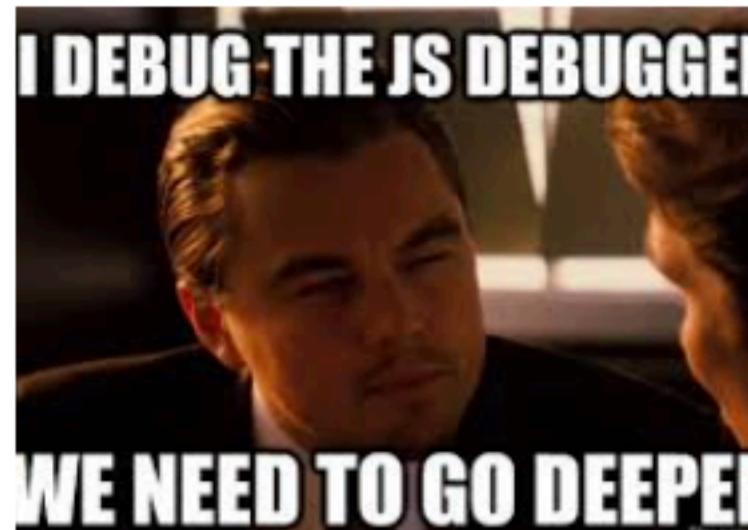
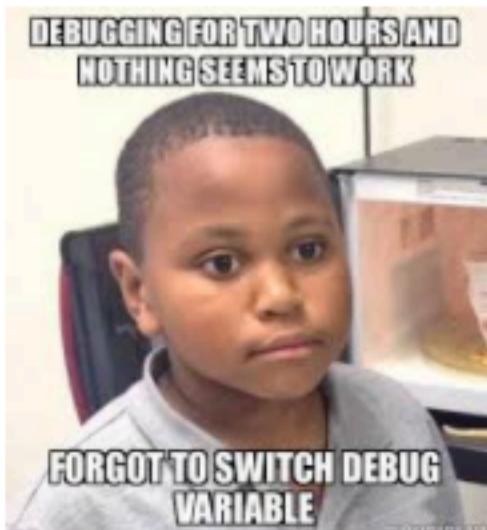
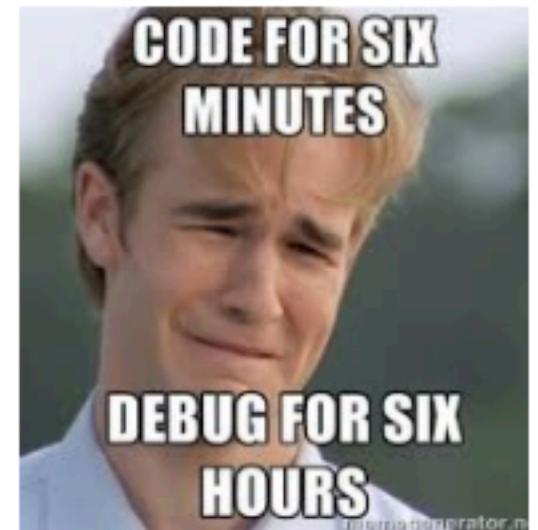
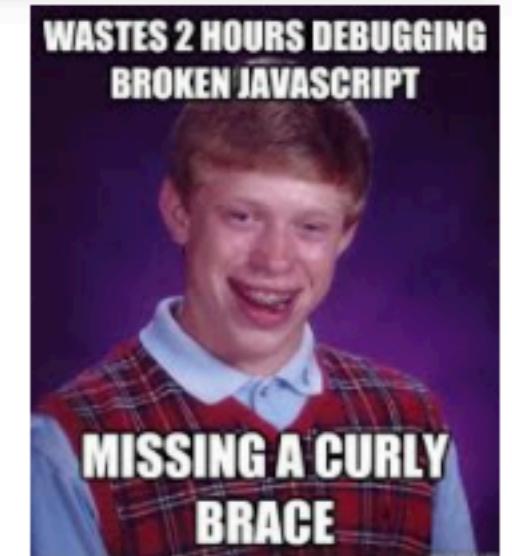
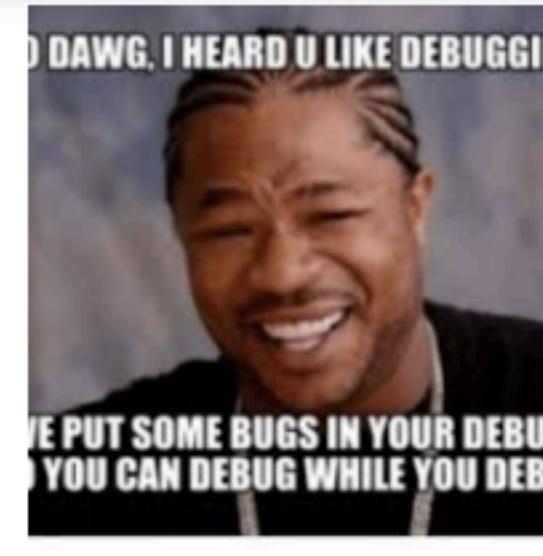


DEBUGGING





debugging meme



92

9/9

0800 Action started
1000 . stopped - action ✓
13"sec (033) MP-MC { 1.2700 9.037 847 025
033 PRO 2 2.130476415
const 2.130676415

Relays 6-2 in 033 failed special speed test
in relay 10,000 test.

1100 Relay changed
1525 Started Cosine Tape (Sine check)
Started Multi Adder Test.

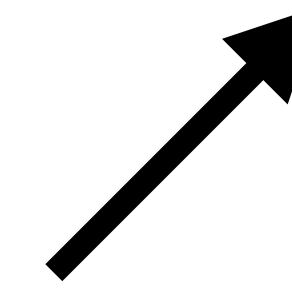
1545 Relay #70 Panel F
(moth) in relay.

1600 First actual case of bug being found.
Action started.

1700 closed down.



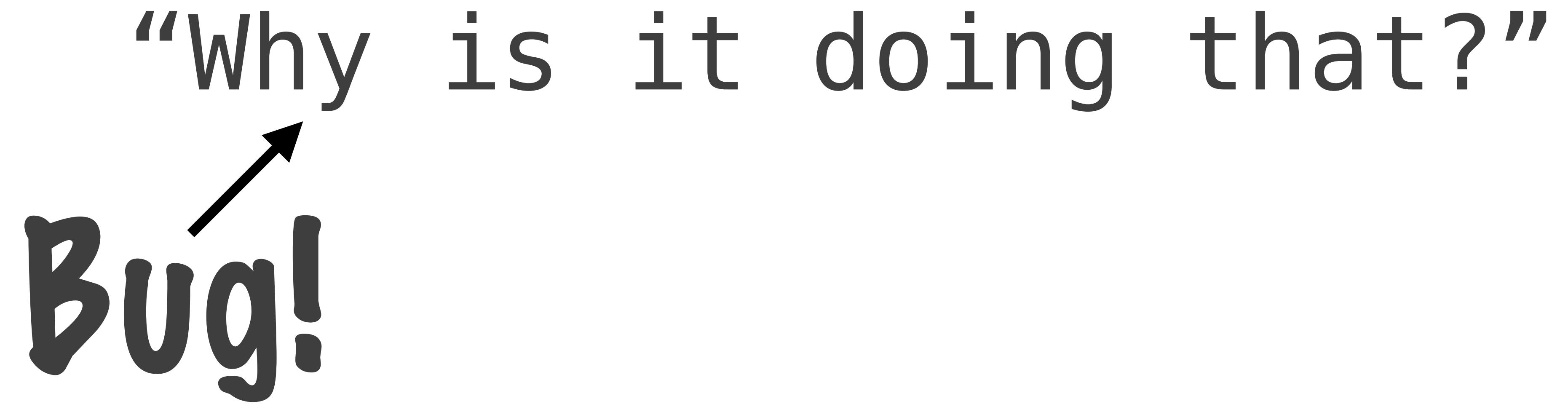
Bug!



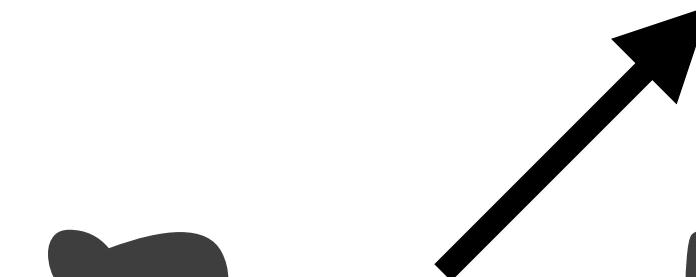
“It doesn’t work!”

Bug!

“Why is it doing that?”



Bug!



“That’s weird.”

```
const foo = `bar;
```

```
function bar () {  
}  
}
```

"We can't send [email]
more than 500 miles"

<https://www.ibiblio.org/harris/500milemail.html>



“Programmers Debugging Software”

It is not so bad.

novice

20x

Time to debug

expert

1x



What You'll Learn Today



BU**J**G

Four blue butterflies are placed on the letters: one on the top-left of the 'B', one on the bottom-left of the 'J', one on the top-right of the 'G', and one on the bottom-right of the 'G'.

Prevention
Detection
Diagnosis
Fixing

PREVENTION

PREVENTION

“Debugging is twice as hard as writing the code in the first place.

Therefore, if you write the code as cleverly as possible, you are,

by definition, not smart enough to debug it.”

– Brian W. Kernaghan

PREVENTION

- 🐛 Readability > smallness
- 🐛 Simple > clever
- 🐛 git hygiene
- 🐛 Formatting matters!

PREVENTION

```
1 async function main
2   () {
3     try { throws();
4   } catch (err) {console.log('caught')} }
```

indentation matters

PREVENTION

```
1 async function main () {  
2   try {  
3     throws();  
4   }  
5   catch (err) {  
6     console.log('caught');  
7   }  
8 }
```

indentation matters

PREVENTION

- 🐛 Readability > smallness
- 🐛 Simple > clever
- 🐛 git hygiene
- 🐛 Formatting matters!
- 🐛 Use functions in your favor
 - ▶ Prefer small, single-purposed and pure functions

PREVENTION

```
1 let result
2 const add (a, b) => {
3   result = a + b
4 }
5 add(10, 20)
6 console.log(result)
```

avoid side-effects

PREVENTION

```
1 const add = (a, b) => a + b  
2 console.log(add(10, 20))
```

avoid side-effects

PREVENTION

```
1 const addOrSubtract = (a, b, operation) =>  
2   operation === 'add' ? a + b : a - b
```

single-purpose functions

PREVENTION

```
1 const add = (a, b) => a + b  
2 const subtract = (a, b) => a - b
```

single-purpose functions

PREVENTION

Tools can get help.

PREVENTION



linter
auto-formatter

PREVENTION



ESLint

PREVENTION

