Loops and Debugging

Overview

```
/*
  - loops
    - while loop
    - for loop
    - break, continue keywords

  - debugging
    - interpreting a stack trace/error message
    - debugging a failing test
    - using debugger
*/
```

while loop

```
/* a while loop requires three elements:
     1. the while keyword
     2. a conditional expression that evaluates to a boolean value
     3. a block of code

   while (conditional) {
     // block of code
   }

   the block of code will run over and over as long as the conditional
   expression evaluates to true
*/


```

while loop

```
let count = 3;

while (count >= 1) {
  console.log('count is', count);
  count--;
}
```

```
count is 3
count is 2
count is 1
```

while loop

```
while (false) {
  console.log('this line of code will never run');
}
```

while loop

```
while (true) {
  console.log('this line will run forever');
  // (or until the machine running the code runs out o
}
```

```
this line will run forever
this line will run forever
this line will run forever
this line will run forever
this line will run forever
this line will run forever
this line will run forever
this line will run forever
this line will run forever
this line will run forever
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this line will run forever
this line will run forever
this line will run forever
this line will run forever
this line will run forever
this line will run forever
this line will run forever
this line will run forever
```

while loop

```
let count = 3;

// have to make sure the conditional is eventually false!
while (count >= 1) {
  console.log('count is', count);
}
```

```
count is 3
count is 3
count is 3
count is 3
count is 3
count is 3
count is 3
count is 3
count is 3
count is 3
count is 3
count is 3
count is 3
count is 3
count is 3
count is 3
count is 3
count is 3
count is 3
count is 3
count is 3
count is 3
count is 3
count is 3
```

for loop

```
/* a for loop requires three elements:
     1. the for keyword
     2. three optional expressions
     3. a block of code

   for (initialization; condition; final-expression) {
     // block of code
   }

   the block of code will run over and over until the condition
   evaluates to false
*/


```

for loop

```
i is: 1
i is: 2
i is: 3
```

```
/* the initialization is run first, and only once. it's often used to
   define a counter variable */

/* then, before every iteration, the condition is checked to see if it's
   true - if it is, the for loop will run another iteration */

/* then, after each iteration, the final expression is run */

for (let i = 1; i <= 3; i++) {
  console.log('i is:', i);
}
```

for loop

```
// loop in either direction
for (let i = 5; i >= 1; i--) {
  console.log('i is:', i);
}
```

```
i is: 5
i is: 4
i is: 3
i is: 2
i is: 1
```

for loop

```
i is: 100
i is: 200
i is: 300
```

```
1   // can increment by any number
2   for (let i = 100; i <= 300; i += 100) {
3     console.log('i is:', i);
4   }
5
6
7
8
9
10
11
12
13
14
```

for loop

```
1   // use for loops to iterate through a string
2   let letters = 'abcdefg';
3
4   for (let i = 0; i < letters.length; i++) {
5     let currentLetter = letters[i];
6     console.log(currentLetter);
7   }
8
9
10
11
12
13
14
```

```
a
b
c
d
e
f
g
```

continue keyword

```
i is: 1
i is: 2
i is: 4
i is: 5
```

```
1  // the continue keyword will cause the loop to skip to the next iteration
2  for (let i = 1; i <= 5; i++) {
3    if (i === 3) {
4      continue;
5    }
6
7    console.log('i is:', i);
8  }
9
10
11
12
13
14
```

continue keyword

```
count is 5
count is 3
count is 1
```

```
1   // the continue keyword also works in while loops
2   let count = 5;
3
4   while (count >= 1) {
5     if (count % 2 === 0) {
6       count--;
7       continue;
8     }
9
10    console.log('count is', count);
11    count--;
12  }
13
14
```

break keyword

```
1  // the break keyword breaks out of the loop permanently
2  let myGrade = 'A';
3
4  while (true) {
5     myGrade += '+';
6
7     if (myGrade.length === 3) {
8       break;
9     }
10 }
11
12 console.log(myGrade);
13
14
```

break keyword

```
i is 10
i is 9
i is 8
i is 7
```

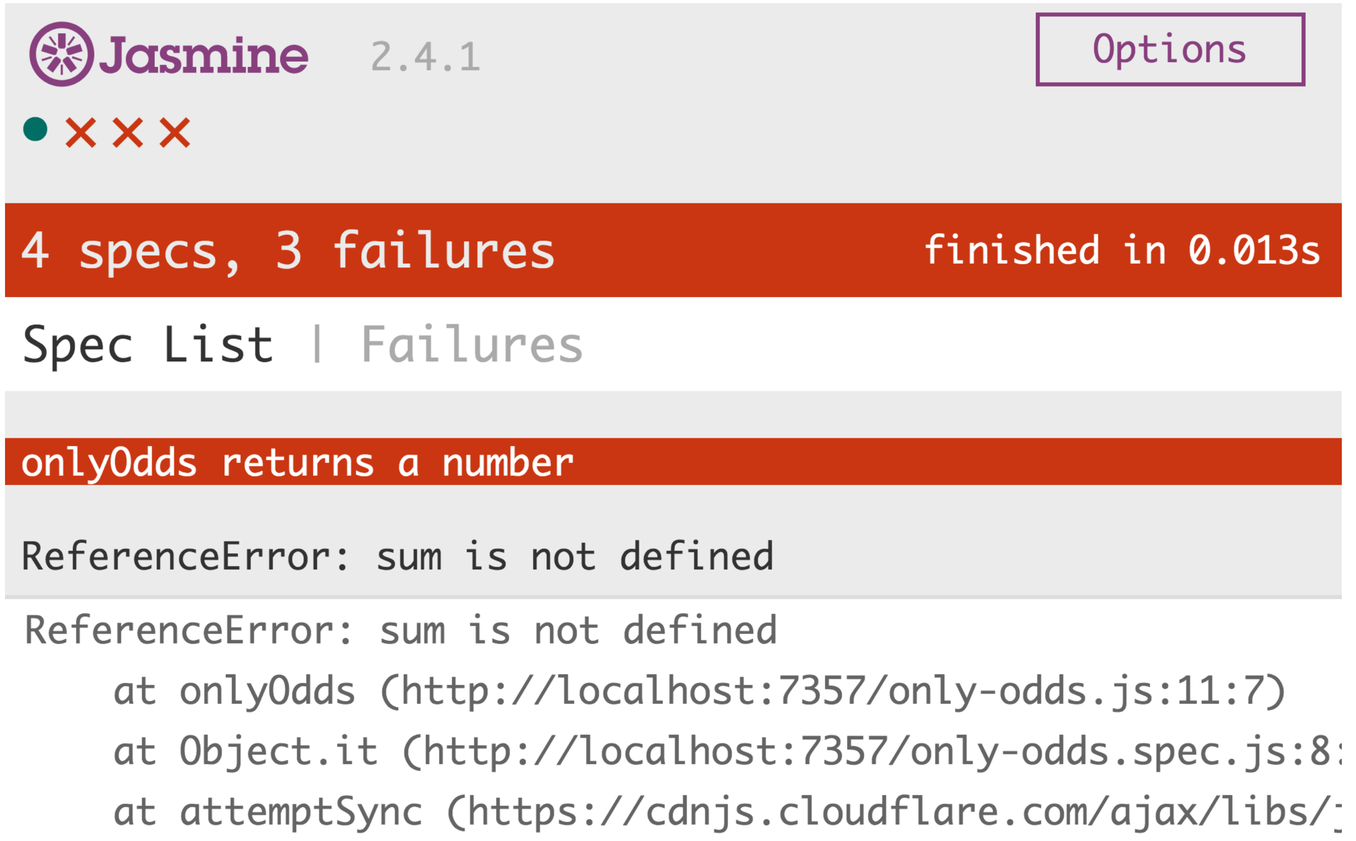
```
1   // the break keyword also works in for loops
2   for (let i = 10; i >= 1; i--) {
3     console.log('i is', i);
4
5     if (i === 7) {
6       break;
7     }
8   }
9
10
11
12
13
14
```

Debugging

```
1   /* Developers spend way more time debugging code than writing it! */
2
3   /* Let's review some good debugging techniques to help you write better
4      code more quickly throughout the remaining workshops */
5
6
7
8
9
10
11
12
13
14
```

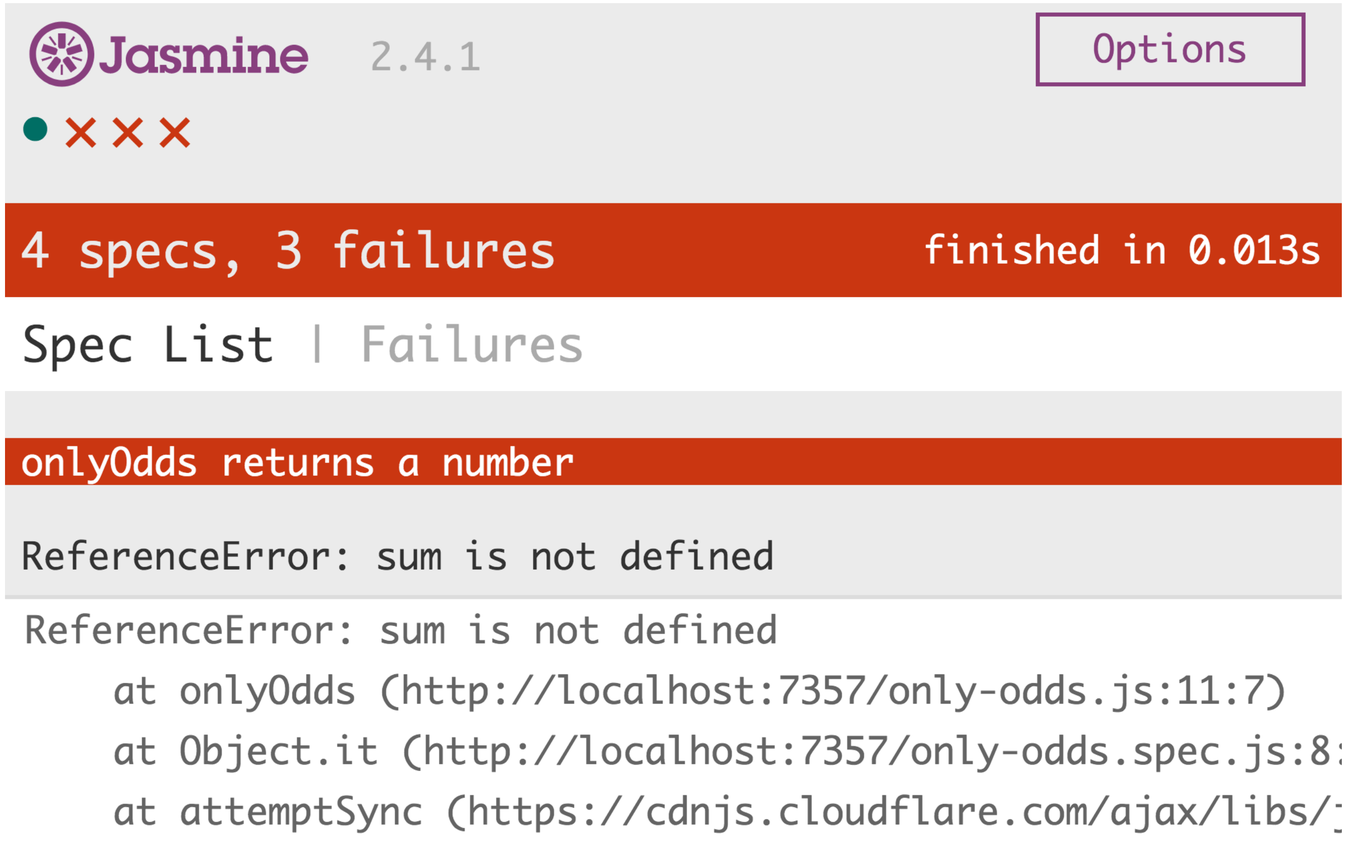
Debugging — error messages

```
1   /* Let's start by considering
2      bugs that come from writing
3      invalid JavaScript code. */
4
5   /* The testem page in your
6      browser passes helpful error
7      messages to you if it
8      couldn't run your code as
9      written */
10
11  /* This ReferenceError means the
12     the code tried to reference a
13     variable called sum that was
14     never defined */
```



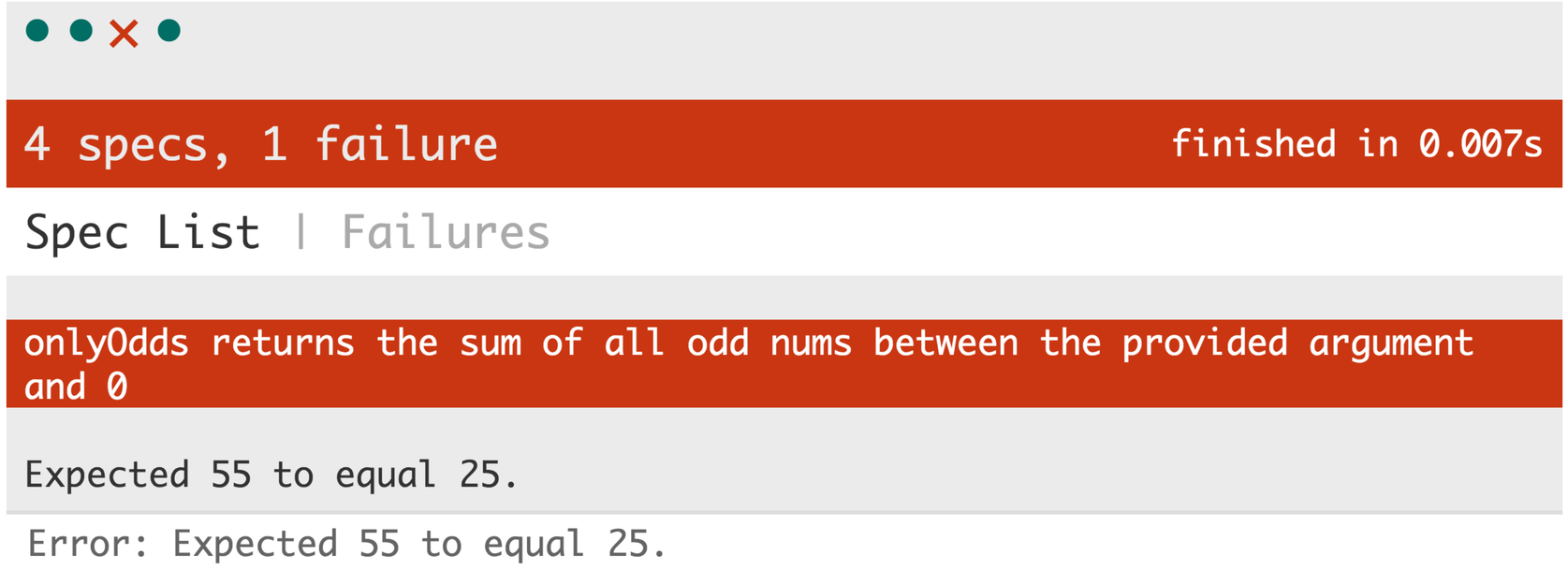
Debugging — error messages

```
1   /* Note the stack trace below the
2      error */
3
4   /* The first at… line gives the
5      location where the error
6      occurred in only-odds.js: it
7      looks like the error happened
8      on line 11. */
9
10  /* This line number may not
11     always be accurate, but its
12     often a good place to start */
13
14  /* Google unfamiliar errors */
```



Debugging — failing tests

```
/* When your test is failing, you'll get an output that compares the value
   your function returned against the expected value. */
```



Debugging — failing tests

```
1   /* Note the plain-english explanation of what the test is looking for;
2      that can help! */
3
4
5
6
7
8
9
10
11
12
13
14
```

```
● ● × ●

4 specs, 1 failure                                    finished in 0.007s

Spec List | Failures

onlyOdds returns the sum of all odd nums between the provided argument
and 0

Expected 55 to equal 25.

Error: Expected 55 to equal 25.
```

Debugging — failing tests

```
/* If your test is failing with "undefined" outputs, makes sure you
   are returning values from your functions, not console.logging them! */
```

Debugging — failing tests

```
/* It can also help to look directly at the code that defines how the test
   is supposed to work. Look for a test in the *.spec.js file with the
   same plain-language explanation, and with the same expect value. */
```

```
it('returns the sum of all odd nums between the provided argument and 0', () => {
  let returnedValue = onlyOdds(10);
  expect(returnedValue).toEqual(25);
});
```

```
/* Now you can see that the test is passing in the number 10 to your
   function. This can help you debug! */

/* All of the code inside of the tests, besides the line that starts with
   expect, is plain-old JavaScript */
```

Debugging — debugger

```
1  /* To use debugger:
2       1. add the debugger keyword in your function in VSCode
3       2. invoke the function yourself */
4  function onlyOdds(num) {
5    debugger; // debugger keyword here
6    let sum = 0;
7    for (let i = num; i >= 1; i--) {
8      if (i % 2 === 1) {
9        sum += i;
10     }
11   }
12   return sum;
13 }
14 onlyOdds(3); // invoking the function ourselves here
```

debugger: Chrome Dev Tools

```
1  /* Open Chrome Dev Tools (right-click > Inspect > Console) */
2
3  /* Run your code in CodePen */
4
5  /* Your code will pause when it hits the debugger keyword */
6
7  /* Note the Scope panel on the right side of the screen. This
8     continuously updates the values assigned to every relevant variable. */
9
10 /* Select the ➔ button to move your code forward one line */
11
12 /* It's sometimes easier to use debugger when you call the function
13    directly through the console instead of letting tests call your code */
14
```

debugger: VSCode

```
1   /* Click the debugging option in VSCode:
2
3      followed by the green debug arrow at the
4      top-left of the screen: DEBUG  No C
5
6      Now, press  to see your code run line by line (press  to stop) */
7
8   /* Note the Variables panel on the left side of the screen. This
9      continuously updates the values assigned to every relevant variable. */
10
11  /* Especially helpful to debug control-flow bugs (like loops) */
12
13
14
```

Recap

```
/*
  - loops
    - while loop
    - for loop
    - break, continue keywords

  - debugging
    - interpreting a stack trace/error message
    - debugging a failing test
    - using debugger
*/
```