

Black-box testing

- Test suite designed without looking at code
 - Can be done by someone other than implementer
 - Will avoid inherent biases of implementer, exposing potential bugs more easily
 - Testing designed without knowledge of implementation, thus can be reused even if implementation changed

Paths through a specification

```
def sqrt(x, eps):
```

```
    """Assumes x, eps floats
```

```
         $x \geq 0$ 
```

```
         $\text{eps} > 0$ 
```

```
    returns res such that
```

```
         $x - \text{eps} \leq \text{res} * \text{res} \leq x + \text{eps}$ """
```

- Paths through specification:
 - $x = 0$
 - $x > 0$
- But clearly not enough

Paths through a specification

- Also good to consider boundary cases
 - For lists: empty list, singleton list, many element list
 - For numbers, very small, very large, “typical”

Example

- For our sqrt case, try these:
 - First four are typical
 - Perfect square
 - Irrational square root
 - Example less than 1
 - Last five test extremes
 - If bug, might be code, or might be spec (e.g. don't try to find root if eps tiny)

x	eps
0.0	0.0001
25.0	0.0001
.05	0.0001
2.0	0.0001
2.0	1.0/2.0**64.0
1.0/2.0**64.0	1.0/2.0**64.0
2.0**64.0	1.0/2.0**64.0
1.0/2.0**64.0	2.0**64.0
2.0**64.0	2.0**64.0