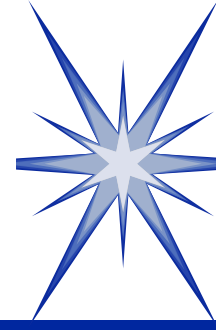


# Testing Programs

Dr Derek Peacock



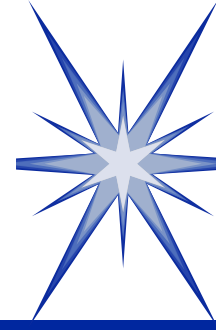
# Errors or 'Bugs'

## ☞ Syntax Errors

- ☞ Undeclared Identifiers
- ☞ Missing semicolon
- ☞ Missing Ends ) ] '
- ☞ incompatible types

## ☞ Semantic Errors

- ☞ Values not initialised
- ☞ Expression incorrect
- ☞ Wrong range (0 versus 1)
- ☞ Incorrect conditions
- ☞ Divide by 0



# Testing Methods

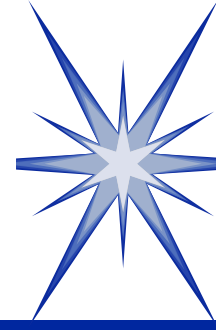
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## ☞ Black Box Testing

- ☞ Testing **what** the program does
- ☞ No knowledge of **how** program works

## ☞ White Box Testing

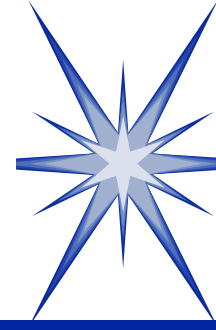
- ☞ Needs detailed knowledge of all code routes
- ☞ Each possible route must be tested



# Test Data

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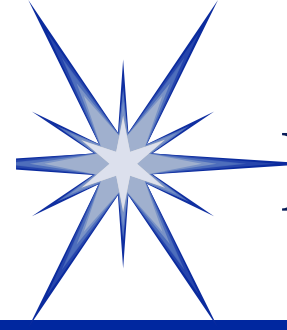
- Every statement executed at least once
- All valid input correctly stored
- All output is from correct source
- Handling of all invalid input
- Every route through
- Accuracy of processing verified
- Program does what was specified



# Categories of Data

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- Normal Data
- Extreme values
  - Largest, smallest, fastest, slowest
- Exceptions
  - Missing values
  - Invalid values
  - Special keys
  - Wrong sequence of actions



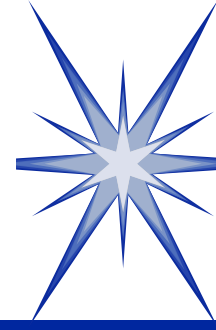
# Equivalence Classes

## Integers 0 to 99

- ☞ All values 0 to 99
- ⌚ Values  $> 99$
- ⌚ Values  $< 0$
- ⌚ Non integer
- ⌚ Non numeric

## 'A', 'B' or 'C'

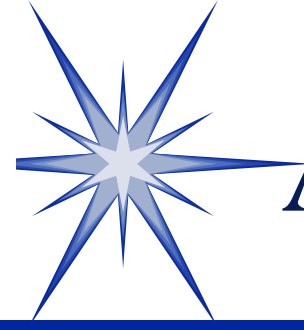
- ☞ 'A'
- ☞ 'B'
- ☞ 'C'
- ⌚ any other value



# Boundary Values

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- ❁ Identify valid and invalid equivalence classes
- ❁ Find boundary values
- ❁ Include in test data e.g.
  - ❁ -1, 0 and 99, 100
  - ❁ '@', 'A' and 'C', 'D'



# Add Number Program

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- Black Box Tests ??
- White Box tests ??