# Black Box Lab Problems

1. For each of the following program specifications design test cases using the boundary value approach:

* If the input value of n is <0, then an appropriate error message must be printed. If 0<=n<20, then the exact value of n! will be printed. If 20<=n<=200, then an approximate value of n! will be printed. Finally if n>200 then the input can be rejected and an error message printed.

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| --- | --- | --- | --- | --- |
| Input Condition | Valid Class | Valid Boundaries | Invalid Class | Invalid Boundaries |
| Value of n | 0-19 | 0(1) 19(2) | <0 | ­-1(6) |
| 20-200 | 20(3) 200(4) | >200 | 201(7) |
| Integer(5) |  | Not an integer(8) | 0.1 |

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| Output condition | Valid Class | Valid Boundaries | Invalid Class | Invalid Boundaries |
| Error Messages |  |  |  |  |
| Too small error |  |  |  |  |
| Too big error |  |  |  |  |

* The input to the program consists of a student’s name which may be up to 20 letters in length, a set of up to three marks each an integer in the range 1 to 100. There will be at least 1 mark for a student. The output from the program will be a list of the students and their average mark.

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| Input condition | Valid Class | Valid Boundaries | Invalid Class | Invalid Boundaries |
| Name | 1-20 | “a – z”(1)  “A – Z”(2) | < 0 and > 20 | 0(7)  21(8) |
|  | String(3) |  | Not a string |  |
| Mark | 1-100 | 1(4)  100(5) | < 1 and > 100 | 0(9)  101(10) |
|  | Integer(6) |  | Not an integer |  |

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| Output Condition | Valid Class | Valid Boundaries | Invalid Class | Invalid Boundaries |
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* Input to a tax calculation program consists of an identification number, ( an upper case letter followed by 1 to 5 digits), a value for marital status, (i.e. single, married, divorced, widowed, separated), and a gross salary. The tax charged is based on three bands:- 1-5000, 5001-20000, 20000+. The tax free allowance is 5000. The tax rate calculated also depends on the marital status. (For this example ignore output classes)

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| Input condition | Valid Class | Valid Boundaries | Invalid Class | Invalid Boundaries |
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| Output condition | Valid Class | Valid Boundaries | Invalid Class | Invalid Boundaries |
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* If the tariff code is a B then fuel costs are charged at 15p/unit for the first 200 units and 5p/unit for the rest. When the tariff code is H the charges are 10p/unit for the first 100 units and 8p/unit for the rest. The program input is a code followed by a number of units. The program output will be the code, the number of units, the cost for the fuel. If an invalid code is entered or if the number of units is greater than 9999 an appropriate error message will be output.

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| Input condition | Valid Class | Valid Boundaries | Invalid Class | Invalid Boundaries |
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| Output condition | Valid Class | Valid Boundaries | Invalid Class | Invalid Boundaries |
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* A user can ‘dial’ a bank using his or her personal computer, provide a six-digit password, and follow with a series of keyword commands that can trigger various banking functions. The data is accepted in the following form:

area code - blank or three-digit number; the second digit must be a 0 or 1, may not be the value 606

prefix - three digit number, not beginning with 0 or 1

suffix - four digit number

password - six character alphanumeric value

command - ‘check’, ‘deposit’, ‘pay’

(Ignore output with this problem)

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| Input condition | Valid Class | Valid Boundaries | Invalid Class | Invalid Boundaries |
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