

Homework 4

(a) How many mutants are there?

There are 243 mutants if select `All method`.

There are **237** mutants if select `int_cal()`.

(b) How many test cases do you need to kill the non-equivalent mutants?

I wrote **10 test cases** to kill non-equivalent mutants. But maybe it can be optimized.

(c) What mutation score were you able to achieve before analyzing for equivalent mutants?

In the beginning, I wrote **5 test cases** and the Mutant Score reached **67%**.

After analyzing which are equivalent mutants, I added another 5 tests to kill the non-equivalent mutants and got a score of 89%.

(d) How many equivalent mutants are there?

There are **26** equivalent mutants in `int_cal()`.

▼ The final result

The screenshot shows the TestCase Runner application interface. The 'Class' is set to 'Cal' and the 'Method' is 'int_cal(int,int,int,int,int)'. The 'Test Case' is 'CalTest' and the 'Time-Out' is '3 seconds'. The 'RUN' button is highlighted in yellow.

On the left, there are two tables showing the results of the mutation testing:

Op	#	Op	#
AO...	36	IHI	0
AO...	1	IHD	0
AOIU	12	IOD	0
AOIS	74	IOP	0
AO...	0	IOR	0
AO...	0	ISI	0
ROR	34	ISD	0
COR	4	IPC	0
COD	0	PNC	0
COI	7	PMD	0
SOR	0	PPD	0
LOR	0	PCI	0
LOI	19	PCC	0
LOD	0	PCD	0
ASRS	0	PRV	0
SDL	10	OMR	0
VDL	13	OMD	0
CDL	5	OAN	0
ODL	22	JTI	0
		JTD	0
		JSI	0
		JSD	0
		JID	0
		JDC	0
		EOA	0
		EOC	0
		EAM	0
		EMM	0
Total : 237		Total : 0	

On the right, there are two tables showing the results of the mutation testing:

Traditional Mutants Result		Class Mutants Result	
Live Mutants #	26	Live Mutants #	0
Killed Mutants...	211	Killed Mutants...	0
Total Mutants...	237	Total Mutants...	0
Mutant Score	89.0%	Mutant Score	- %

Below these tables, there are two lists of mutants:

Live	Killed
AOIU_4	AORB_1
AOIU_5	AORB_2
AOIU_6	AORB_3
AOIS_11	AORB_4
AOIS_12	AORB_5
AOIS_15	AORB_6
AOIS_16	AORB_7
AOIS_27	AORB_8
AOIS_28	AORB_9
AOIS_31	AORB_10
AOIS_32	AORB_11
AOIS_35	AORB_12
AOIS_36	AORB_13
AOIS_39	AORB_14
AOIS_40	AORB_15
AOIS_43	AORB_16
AOIS_44	AORB_17
AOIS_51	AORB_18
AOIS_52	AORB_19
AOIS_55	AORB_20
AOIS_56	AORB_21
AOIS_71	AORB_22
AOIS_72	AORB_23

The source code and test cases:

<https://github.com/season06/NYCU-Software-Testing-2022/tree/master/Homework/HW4>