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CS 362 -Software Engineering II-

Week 5 – Random Testing

For this document, you will need to fill out the information below. Ensure you have 5 triggering numbers for each bug or you will receive zero points for the bug. Your theory must fit the 5 provided numbers to receive any points. To receive full points, your theory must match the actual coded error, so you may need more than 5 data points for each bug to successfully determine the causes.

- **Bug 1**

- **Triggering credit card numbers (at least 5)**

- 6733107176364796
 - 1853087391839696
 - 9223433266700140
 - 7520677740068060
 - 8411453343736952

- **Theory that explains what triggered the bug**

- This bug seems to be triggered by card numbers which are 16 digits and have a valid checksum, but begin with invalid prefixes (none of the five ranges listed for the “valid” cards in the assignment). Of the thousands of triggering numbers generated, none started with 4 (Visa), any starting with 2 did not fall between 2221- and 2720- (MasterCard), any starting with 3 did not start with 34- or 37- (American Express), and any starting with 5 did not start with 51- through 55- (MasterCard). In addition, all integers (except 4) were present as starting numbers, so the bug does not seem to only affect one or a group of integers, but all 1-9 (except 0). I found no other commonality between the triggering numbers, and the number of triggering numbers per data set (if none of the numbers have valid prefixes) was about 10% of the set, which is what is to be expected for the percentage of a set to randomly have a valid Luhn checksum (for example, of a set of size 1000 of random 16 digit numbers without valid prefixes, approximately 100 triggers should occur if a valid Luhn checksum is the only factor, and these are the sort of numbers I saw).

- **Bug 2**

- **Triggering credit card numbers (at least 5)**

- 4052893354638618
 - 4052830771010716
 - 4052267935623300
 - 4052977430161453
 - 4052715469688529

- **Theory that explains what triggered the bug**

- This bug seems to be triggered by valid Visa numbers (prefix 4, 16 digits, and valid checksum) which begin with 4052-. All numbers which triggered this bug started with these four digits, but the rest of the digits varied randomly (though

always made a valid Luhn checksum). No other criteria seemed to hold for each triggering number.

- **Bug 3**

- **Triggering credit card numbers (at least 5)**

- 349460624223935
 - 377331190022669
 - 379697310682071
 - 349545926578083
 - 376607178224497

- **Theory that explains what triggered the bug**

- This bug seems to be triggered by valid American Express cards (start with 34 or 37, have 15 digits, and valid checksum) which end in an odd number. After generating thousands of numbers, the only ones to trigger this bug are the type described above. All ended in a 1, 3, 5, 7, or 9, and none ever ended in an even number. I could find no other commonality between the thousands of triggering numbers.

- **Bug 4**

- **Triggering credit card numbers (at least 5)**

- 4020687736994020
 - 6794762632426794
 - 3474849384893474
 - 1382464973051382
 - 7664415753437664

- **Theory that explains what triggered the bug**

- This bug seems to be triggered by 16-digit numbers whose first four and last four digits are the same. The other 8 digits in-between do not seem to matter, nor does the prefix or the Luhn checksum. Both valid and invalid prefixes and checksums trigger the bug, so only the first and last four digits seem to matter (and those four digits need to be the same).

- **Bug 5**

- **Triggering credit card numbers (at least 5)**

- 344091111153064
 - 4726681111907483
 - 5451111242466447
 - 2282881111042774
 - 375650813111126

- **Theory that explains what triggered the bug**

- This bug seems to be triggered by valid card numbers (prefix, size, and checksum all valid) which have a series of four 1s in their number (-1111-). None of the triggering numbers were invalid, nor did any other group of four of the same number trigger the bug. There were triggering numbers from all card types, and they did not seem to have any other matching criteria.