International Journal of Law, Justice and Jurisprudence

E-ISSN: 2790-0681
P-ISSN: 2790-0673
Impact Factor: RJIF: 5.67
www.lawjournal.info
IJLJJ 2025; 5(2): 441-449
Received: 19-09-2025
Accepted: 22-10-2025

Sam Han
Ph.D., J.D. Department of Intellectual Property and Technology Thomas E. Lees, LLC Ohio, United States of America

Correspondence Author:
Sam Han
Ph.D., J.D. Department of Intellectual Property and Technology Thomas E. Lees, LLC Ohio, United States of America

Mathematical modulo operations in consumer debt collection cases as a tool for demonstrating that paper documents are printouts from manufactured intervening files

Sam Han

DOI: https://www.doi.org/10.22271/2790-0673.2025.v5.i2e.258

Abstract
In 2016, Emmy Award winning host John Oliver reported on the debt-collection industry, in which he exposed fraud being committed on a massive scale. That same fraud-prevalent industry has been the subject of numerous investigations and penalties imposed by the Consumer Financial Protection Bureau (CFPB). Because the fraudulent behaviors of debt collectors have been exposed through lawsuits and reports from various media outlets, debt collectors now employ more sophisticated evidence-manufacturing techniques in pursuit of their collection efforts. Those techniques are so convincing that consumers face resistance from courts that routinely enter adverse judgments against the consumers based on the manufactured evidence. This paper introduces reliable mathematical procedures (namely, modulo operations) to reliably detect irregularities in paper documents that demonstrate that there was some intervening manipulation of an original electronic file (either by human hands or by a computer program) before generating the paper printout. The novelty of using modulo arithmetic is that the mathematics alone permits detection of pre-printing manipulation without the use of metadata.

Keywords: Mathematics, modulo operations, manufactured evidence, electronic files, paper documents, printouts, fraud

Introduction

In 2016, Emmy Award winning host John Oliver [1] reported on the debt-collection industry, in which he has exposed fraud being committed on a massive scale in that industry [2]. That same fraud-rife industry has been the subject of numerous investigations and penalties imposed by the Consumer Financial Protection Bureau (CFPB) [3], whose parent agency is the U.S. Federal Reserve [4].

Because the fraudulent behaviors of debt collectors have been exposed through lawsuits by the CFPB [5] and through reports from various media outlets [6], debt collectors now employ more sophisticated electronic-evidence-manufacturing techniques in pursuit of their debt-collection efforts [7]. Those techniques are so convincing that alleged debtors face resistance from courts that routinely ignore the anomalies in the manufactured evidence and enter judgment against the alleged debtor based on the manufactured evidence [8].

This paper introduces reliable mathematical procedures (namely, modulo operations (also denoted as modulo mathematics or modular arithmetic)) to reliably detect irregularities in paper documents that demonstrate that there was some intervening manipulation of an original electronic file (either by human hands or by a computer program) before generating the paper printout. The novelty of using modulo arithmetic is that the mathematics alone permits detection of data manipulation without relying on metadata.

For purposes of organization, this paper includes the following sections:

a) **Section 2:** Discusses modulo operations as background information for applying the mathematics to paper documents;
b) **Section 3:** Shows examples of paper documents that have been allegedly printed directly from original electronic documents;
c) **Section 4:** Applies the modulo operations to the example paper documents and, further,

explains how the mathematics demonstrate that the paper documents are printouts from manufactured intervening files (rather than direct printouts from original electronic files);

d) **Section 5:** Quotes directly from sworn testimony that reinforces that the paper documents cannot be direct printouts from original electronic files; and

e) **Section 6:** Provides concluding remarks.

Before continuing, the author wishes to clarify that this paper is applicable only to the legal system in the United States (U.S.), as the author is not a practitioner in any other foreign jurisdiction.

Also, documents from which example portions were copied for the figures are available from publicly filed court documents (as demonstrated from the electronic court stamp on the documents). Because those documents were downloaded from public records (such as court proceedings), the publicly available documents were uploaded and made available for access through a reputable research repository, such as Zenodo (which is used by the National Aeronautics and Space Administration (NASA)) [9]. In other words, rather than providing an appendix, citations to the Zenodo links are provided in footnotes, along with citations to the court docket numbers for the cases from which the documents were obtained.

Section 2: Traditional mathematics used to identify anomalies

This Section 2 identifies and explains modulo operations to familiarize the reader with the mathematical concept before proceeding to subsequent sections that apply modulo arithmetic to the paper printouts of alleged electronic files. This section also provides reasons for why modulo arithmetic is significant in detecting anomalies in paper printouts of alleged original electronic files without the use of metadata.

Even though the legal profession may not be familiar with the phrase "modulo operations," the authors are confident that everyone has at least encountered the concept of modulo operations. Specifically, a modulo operation (also designated as modular mathematics or modular arithmetic) is simple division with remainders [10].

The standard notations for modulo operations are:

$$a\%n \quad \text{[Eq. 1]},$$

or

$$a \bmod n \quad \text{[Eq. 2]},$$

or

$$\bmod (a, n) \quad \text{[Eq. 3]},$$

with a being an integer and n being an integer [11]. In application or practice, Eqs. 1, 2, and 3 represent integer a being divided by integer n, with the result of the modulo operation being a remainder portion of the arithmetic operation [12]. So, for example, if the equation is mod (7,3), or 7 mod 3, or 7%3, then the operation results in:

$$\bmod (7,3) = 1 \quad \text{[Eq. 4]},$$

because:

$$7 / 3 = 2 \text{ with a remainder of } 1 \quad \text{[Eq. 5]},$$

which can also be written as 7 / 3 = 2 R1. In other words, only when n is a factor of a would the modulo operation result in an answer of zero (0) [13]. This is because any division by non-factor numbers results mathematically in a remainder [14].

The modulo operation is relevant when reviewing a one-page paper document with line numbers, which is allegedly printed from a larger document that cannot fit onto a single page (e.g., a spreadsheet or other database that has hundreds, if not thousands, of lines).

By way of example, if a document with ten thousand (10,000) lines is printed with only twenty-one (21) lines per page, then the last line on any given page must be a multiple of 21 (unless there has been some intervention or manipulation by a human or a computer program to shift upward or shift downward the printed lines). In other words, the first (1st) page must begin at line 1 and end at line 21 (because 21%21 = 0); the second (2nd) page must begin at line 22 and end at line 42 (because 42%21 = 0); the third (3rd) page must begin at line 43 and end at line 63 (because 63%21 = 0); the fourth (4th) page must begin at line 64 and end at line 84 (because 84%21 = 0); and so on until all 10,000 lines are printed. In other words, for a document with 21-lines-per-page, the modulo operation produces the following mathematical result:

$$\bmod(\text{LastLine},21) = 0 \quad \text{[Eq. 6]}.$$

Consequently, if mod(LastLine,21) does not equal zero (0), then the modulo operation demonstrates that the paper document cannot be a direct printout of 21-lines-per-page from an original electronic file. Rather, any remainder demonstrates that an intervening was generated prior to printing, thereby deliberately shifting the lines to offset the last line number on the page.

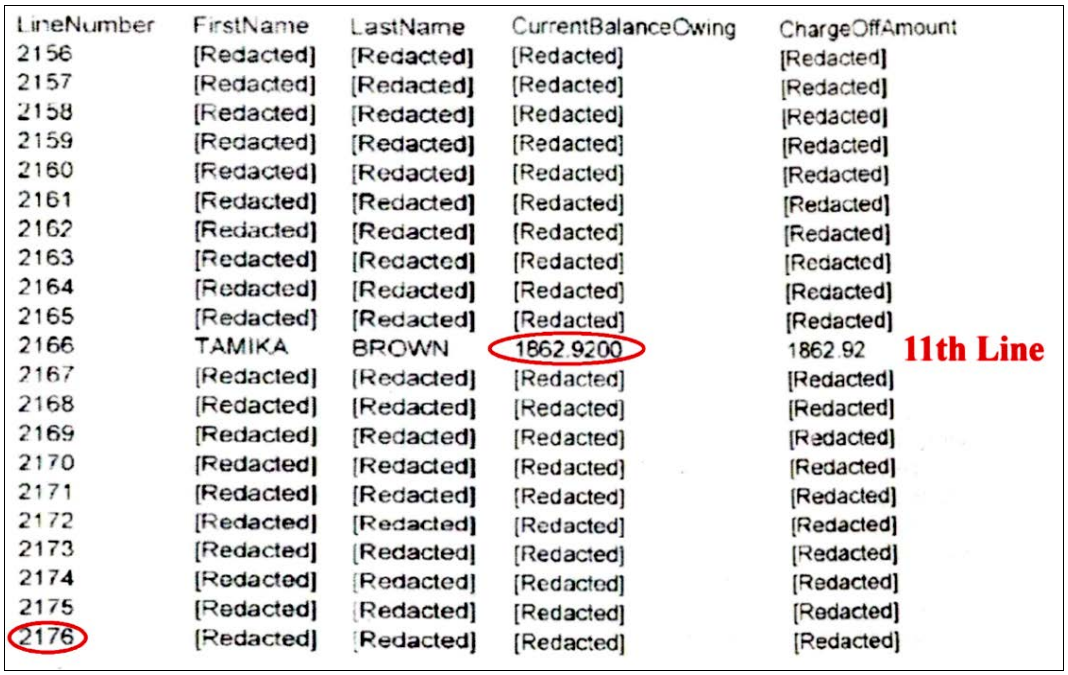
Section 3: Manufactured evidence to which mathematics are applied

With the mathematical concepts explained, this Section 3 reproduces and enlarges several excerpts from paper printouts that have been filed in various courts. The excerpted examples are shown as figure inserts, with their respective corresponding full documents cited as downloadable links in footnotes.

For purposes of illustration, added to the excerpts are red circles, of which the red circle at the bottom of the first column ("LineNumber") is the relevant number for analysis using modulo arithmetic. Also, for consistency, the examples herein are documents from one (1) particular entity (namely, LVNV Funding, LLC (hereinafter, "LVNV")) filed in one (1) particular jurisdiction (namely, the Municipal Court of Hamilton County, Ohio, U.S.A.) [15]. However, the same mathematical principles apply to correspondingly similar documents from other similar entities filed in other jurisdictions [16].

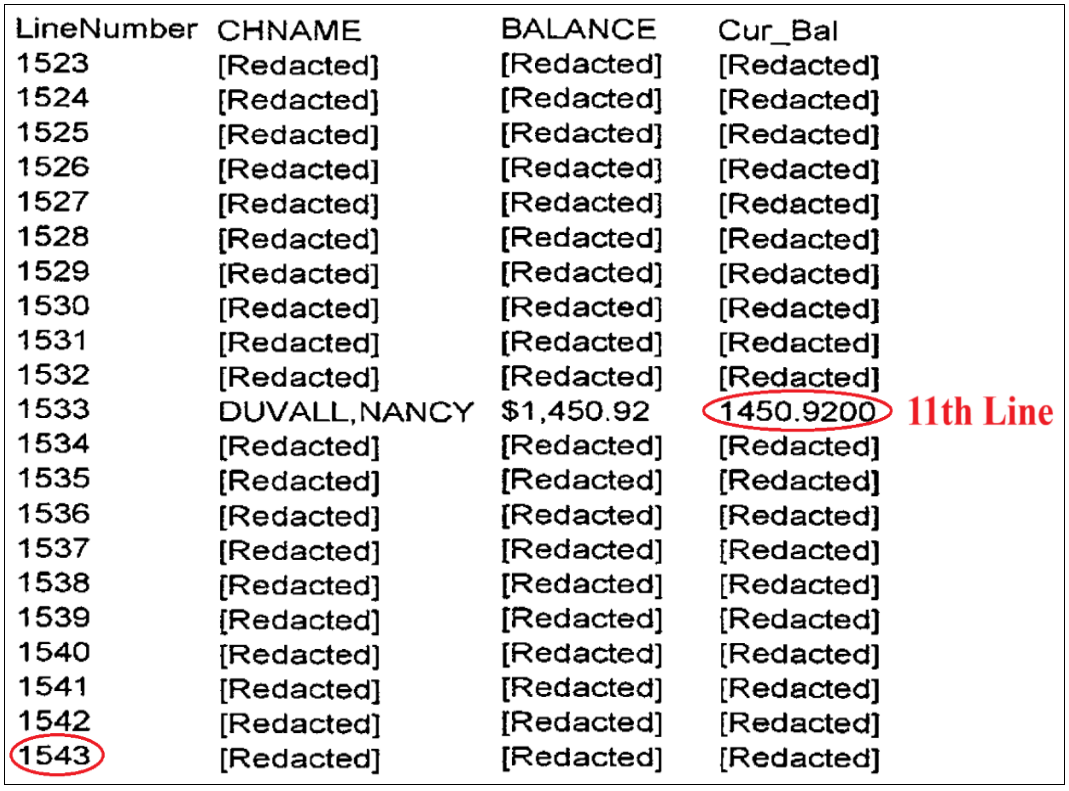
With this in mind, the documents for analysis in this paper are taken directly from the following legal cases *LVNV Funding, LLC v. Tamika Brown*, Case Number 24CV01441 (Municipal Court, Hamilton County, Ohio) (hereinafter, "Brown Case"); *LVNV Funding, LLC v. Nancy Duvall*, Case Number 23CV28211 (Municipal Court, Hamilton County, Ohio) (hereinafter, "Duvall Case"); *LVNV Funding, LLC v.*

Henry Flowers, Case Number 24CV21667 (Municipal Court, Hamilton Count, Ohio) (hereinafter, "Flowers Case"); *LVNV Funding, LLC v. Paul Loveless*, Case Number 24CV17562 (Municipal Court, Hamilton County, Ohio) (hereinafter, "Loveless Case"); *LVNV Funding, LLC v. Eileen Pike*, Case Number 23CV28432 (Municipal Court, Hamilton County, Ohio) (hereinafter, "Pike Case"); *LVNV Funding, LLC v. Damien Townsend*, Case Number 23CV28432 (Municipal Court, Hamilton County, Ohio) (hereinafter, "Townsend Case"); and *LVNV Funding, LLC v. Baron Wynter*, Case Number 24CV21026 (Municipal Court, Hamilton County, Ohio) (hereinafter, "Wynter Case"). The relevant excerpts are reproduced sequentially below.



LineNumber	FirstName	LastName	CurrentBalanceOwing	ChargeOffAmount	
2156	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
2157	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
2158	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
2159	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
2160	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
2161	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
2162	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
2163	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
2164	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
2165	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
2166	TAMIKA	BROWN	1862.9200	1862.92	11th Line
2167	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
2168	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
2169	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
2170	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
2171	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
2172	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
2173	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
2174	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
2175	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
2176	[Redacted]	[Redacted]	[Redacted]	[Redacted]	

[17],



LineNumber	CHNAME	BALANCE	Cur_Bal	
1523	[Redacted]	[Redacted]	[Redacted]	
1524	[Redacted]	[Redacted]	[Redacted]	
1525	[Redacted]	[Redacted]	[Redacted]	
1526	[Redacted]	[Redacted]	[Redacted]	
1527	[Redacted]	[Redacted]	[Redacted]	
1528	[Redacted]	[Redacted]	[Redacted]	
1529	[Redacted]	[Redacted]	[Redacted]	
1530	[Redacted]	[Redacted]	[Redacted]	
1531	[Redacted]	[Redacted]	[Redacted]	
1532	[Redacted]	[Redacted]	[Redacted]	
1533	DUVALL,NANCY	$1,450.92	1450.9200	11th Line
1534	[Redacted]	[Redacted]	[Redacted]	
1535	[Redacted]	[Redacted]	[Redacted]	
1536	[Redacted]	[Redacted]	[Redacted]	
1537	[Redacted]	[Redacted]	[Redacted]	
1538	[Redacted]	[Redacted]	[Redacted]	
1539	[Redacted]	[Redacted]	[Redacted]	
1540	[Redacted]	[Redacted]	[Redacted]	
1541	[Redacted]	[Redacted]	[Redacted]	
1542	[Redacted]	[Redacted]	[Redacted]	
1543	[Redacted]	[Redacted]	[Redacted]	

[18],

LineNumber	BrwrFirstName	BrwrLastName	PurchaseBalance	ChgOffBalance	PurchaseIntBal	ChgOffInt	
230	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
231	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
232	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
233	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
234	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
235	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
236	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
237	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
238	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
239	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
240	HENRY	FLOWERS	1257.350	1257.35	77.650	77.65	11th Line
241	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
242	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
243	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
244	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
245	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
246	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
247	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
248	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
249	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	
250	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	

[19],

LineNumber	FirstName	LastName	CurrentBalanceOwing	
3141	[Redacted]	[Redacted]	[Redacted]	
3142	[Redacted]	[Redacted]	[Redacted]	
3143	[Redacted]	[Redacted]	[Redacted]	
3144	[Redacted]	[Redacted]	[Redacted]	
3145	[Redacted]	[Redacted]	[Redacted]	
3146	[Redacted]	[Redacted]	[Redacted]	
3147	[Redacted]	[Redacted]	[Redacted]	
3148	[Redacted]	[Redacted]	[Redacted]	
3149	[Redacted]	[Redacted]	[Redacted]	
3150	[Redacted]	[Redacted]	[Redacted]	
3151	PAUL	LOVELESS	900.4200	11th Line
3152	[Redacted]	[Redacted]	[Redacted]	
3153	[Redacted]	[Redacted]	[Redacted]	
3154	[Redacted]	[Redacted]	[Redacted]	
3155	[Redacted]	[Redacted]	[Redacted]	
3156	[Redacted]	[Redacted]	[Redacted]	
3157	[Redacted]	[Redacted]	[Redacted]	
3158	[Redacted]	[Redacted]	[Redacted]	
3159	[Redacted]	[Redacted]	[Redacted]	
3160	[Redacted]	[Redacted]	[Redacted]	
3161	[Redacted]	[Redacted]	[Redacted]	

[20],

LineNumber	first_name	last_name	
341	[Redacted]	[Redacted]	
342	[Redacted]	[Redacted]	
343	[Redacted]	[Redacted]	
344	[Redacted]	[Redacted]	
345	[Redacted]	[Redacted]	
346	[Redacted]	[Redacted]	
347	[Redacted]	[Redacted]	
348	[Redacted]	[Redacted]	
349	[Redacted]	[Redacted]	
350	[Redacted]	[Redacted]	
351	Eileen	Pike	11th Line
352	[Redacted]	[Redacted]	
353	[Redacted]	[Redacted]	
354	[Redacted]	[Redacted]	
355	[Redacted]	[Redacted]	
356	[Redacted]	[Redacted]	
357	[Redacted]	[Redacted]	
358	[Redacted]	[Redacted]	
359	[Redacted]	[Redacted]	
360	[Redacted]	[Redacted]	
361	[Redacted]	[Redacted]	

[21],

LineNumber	CHNAME	COAMOUNT	Cur_Bal	
1960	[Redacted]	[Redacted]	[Redacted]	
1961	[Redacted]	[Redacted]	[Redacted]	
1962	[Redacted]	[Redacted]	[Redacted]	
1963	[Redacted]	[Redacted]	[Redacted]	
1964	[Redacted]	[Redacted]	[Redacted]	
1965	[Redacted]	[Redacted]	[Redacted]	
1966	[Redacted]	[Redacted]	[Redacted]	
1967	[Redacted]	[Redacted]	[Redacted]	
1968	[Redacted]	[Redacted]	[Redacted]	
1969	[Redacted]	[Redacted]	[Redacted]	
1970	TOWNSEND,DAMIEN	$1,333.10	1333.1000	11th Line
1971	[Redacted]	[Redacted]	[Redacted]	
1972	[Redacted]	[Redacted]	[Redacted]	
1973	[Redacted]	[Redacted]	[Redacted]	
1974	[Redacted]	[Redacted]	[Redacted]	
1975	[Redacted]	[Redacted]	[Redacted]	
1976	[Redacted]	[Redacted]	[Redacted]	
1977	[Redacted]	[Redacted]	[Redacted]	
1978	[Redacted]	[Redacted]	[Redacted]	
1979	[Redacted]	[Redacted]	[Redacted]	
1980	[Redacted]	[Redacted]	[Redacted]	

[22], and

LineNumber	CHNAME	HIGHBALANCE	COAMOUNT	Cur_Bal	LastPurchaseAmount
26309	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
26310	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
26311	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
26312	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
26313	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
26314	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
26315	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
26316	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
26317	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
26318	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
26319	WYNTER,BARON	$637.67	$637.67	637.6700	58.3700
26320	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
26321	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
26322	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
26323	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
26324	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
26325	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
26326	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
26327	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
26328	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
26329	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]

11th Line

[23].

As one can see from these excerpts, every printout has exactly twenty-one (21) substantive lines (twenty-two (22) lines, should the heading row be added to the count). Furthermore, in every printout, the only relevant line with substantive information is the eleventh (11th) line. Lastly, every printout has a "LineNumber" column in which alleged line numbers are sequentially listed in each row (with the last "LineNumber" that is circled in red being the operative number on which the modulo mathematics is applied).

Section 4: Application Of Modulo Operations to Printed Documents

With the modulo operations explained in Section 2 and examples of paper printouts provided in Section 3, this Section 4 straightforwardly applies the mathematical concepts from Section 2 to the example printouts from Section 3. Before doing so, this Section 4 first provides some legal background relating to electronic banking documents, thereby providing some context for why the modulo operations are significant. Thereafter, this Section 4 explains how the modulo operations demonstrate that the documents cannot be direct printouts from original electronic files but, instead, from files that have been manipulated in some manner before printing.

Modulo arithmetic is applied to detect within-document mathematical anomalies (rather than between-document mathematical anomalies), which permit detection of document fabrication without referencing any metadata or underlying electronic document properties. It should, however, be noted that the underlying document properties would only reinforce the conclusion derived from mathematics, namely, that the documents are fabricated (as shown in Section 5, *infra*) [24].

4.1 Format Requirements for Accounts Held by U.S. Banking Institutions

Briefly, under the United States Code (U.S.C.), "United States money is expressed in dollars, dimes or tenths, cents or hundredths, and mills or thousandths. A dime is a tenth of a dollar, a cent is a hundredth of a dollar, and a mill is a thousandth of a dollar." [25] Furthermore, the Code of Federal Regulations (C.F.R.) mandates particular data structures for bank account files [26]. Specifically, the C.F.R. mandates that the data structure of the file be in tab-delimited or pipe-delimited ASCII (American Standard Code for Information Interchange) format [27], which is a text file with no additional formatting for style or layout (e.g., bold, underline, italics, etc.) [28]. For monetary values, the C.F.R. requires that the specific format be "Decimal [14,2]" (meaning, fourteen (14) total digits, with only two (2) decimal places after a radix (i.e., decimal point)) [29].

Consequently, any file that is allegedly from a U.S. bank that is insured by the Federal Deposit Insurance Company (FDIC) must comply with the U.S.C.- and C.F.R.-formatting requirements. In other words, any U.S.C.- or C.F.R.-compliant file cannot have data that is formatted for style or layout (because ASCII lacks any ability to preserve layout or style information) [30].

4.2 Identification of Within-Document Mathematical Anomalies

Because all bank files in their natural state must be ASCII files (which lacks any layout or style information), modulo arithmetic can be used as a tool to demonstrate within-document mathematical anomalies that should not naturally exist in ASCII files (absent some external intervention by a human or computer or otherwise).

As shown in Section 3, *supra*, all of the excerpts have exactly twenty-one (21) substantive lines (twenty-two (22) lines, should the heading be counted separately). The Brown File begins at line number 2156 and ends at line number of 2176 [31]. The Duvall File ends at line 1543; the Flowers File ends at line 250; the Loveless File ends at line 3161; the Pike File ends at line 361; the Townsend File ends at line 1980; and the Wynter File ends at line 26329 [32]. Thus, by their own line numberings, it is clear that none of the excerpts are direct printouts of the first page of their respective underlying electronic files (as none of the printouts begin on line 1).

Consequently, with twenty-one (21) lines on each of the preceding pages, a straightforward printing of the underlying electronic files, without any external intervention to shift upward or downward the printout, should result in mod(LastLine,21) = 0 (as calculated from [Eq. 6], *supra*). However, the modulo operation results in a non-zero value, specifically:

a) **Brown File:** mod(2176,21) = 13 (non-zero remainder, specifically, 103 R13);

b) **Duvall File:** mod(1543,21) = 10 (again, non-zero remainder, specifically, 73 R10);

c) **Flowers File:** mod(250,21) = 19 (non-zero remainder, specifically, 11 R19);
d) **Loveless File:** mod(3161,21) = 11 (non-zero remainder, specifically, 150 R11);
e) **Pike File:** mod(361,21) = 4 (non-zero remainder, specifically, 17 R4)
f) **Townsend File:** mod(1980,21) = 6 (non-zero remainder, specifically, 94 R6); and
g) **Wynter File:** mod(26329,21) = 16 (non-zero remainder, specifically, 1253 R16).

The upward-shifted or downward-shifted rows that prevent the mathematical result of mod(LastLine,21) = 0 demonstrate that none of the excerpts can be direct printouts of their respective original electronic documents. Without any reasonable explanation for the row-shifted printouts, and without any need to review underlying metadata of the electronic files, modulo arithmetic demonstrates that a mathematical anomaly exists. From that anomaly, one can reasonably conclude that the LVNV Files are not direct printouts from the original ASCII file but, rather, a printout from an intermediate file that was manufactured from the original ASCII file before generating the printout.

As shown here, with only the reliable implementation of modulo arithmetic (and without the need to rely on specialized information that is available from metadata of electronic files), one can identify within-document mathematical anomalies. At a minimum, the offset that is calculated by modulo arithmetic demonstrates that an intermediate document was manufactured before printing to paper the alleged one-page document.

Section 5: Confirmation that printout is from fabricated intervening file

From a scientific standpoint, modulo arithmetic alone should be sufficient to conclude with a reasonable degree of certainty that paper documents are printed from an intermediate manufactured electronic file (rather than being directly printed from an original electronic ASCII file). The conclusion that the documents are manufactured for litigation is confirmed by sworn testimony from the debt collectors themselves. Specifically, the corporate representative for LVNV confirmed that: (a) the original files from the banks are text files (meaning, ASCII files with no style or layout formatting); and (b) the original ASCII files are not re-formatted for appearance or ease-of-use [33]. Verbatim testimony from LVNV includes:

Q: And then so explain how that text file is presented.
A: The text file shows the information and it is separated by commas.
Q: Okay. So is it in lines or is it just this big, massive document?
A: You and I might have different explanations or descriptions of a big, massive document. But just like any text file, it is text that -- it's a little harder for humans to view, works great for computer systems. But it is a text file that shows the information for each account. And the fields are separated by commas [34].

In other words, due to the file lacking any style or layout formatting, the alleged original electronic file is "harder for humans to view." [35] Because of this, LVNV further testified that if LVNV wanted to lie, then LVNV would have taken that hard-for-humans-to-view text file and manipulated it to "make it look nice and pretty[.]"[36] Again, the verbatim testimony was:

A: The easiest thing we could do if we wanted to lie was to make it look nice and pretty, but we do not. It is exactly how each seller prepares their file and they send it to us. And we do not alter their data or change their data even if formatting would make it look a whole lot better [37].

In other words, LVNV's sworn testimony is that not even the formatting is altered from "how each seller prepares their file" (namely, in ASCII text). Consequently, LVNV's sworn testimony reinforces the fact that the style-and-layout formatted Printed Files (as shown in Section 4) are manufactured documents (and not original ASCII-formatted electronic files, certainly not files that comply with the formatting requirements for banking institutions under the C.F.R.).

In the context of modulo arithmetic, if the original electronic file was never altered or changed, then a direct printout (without any human or computer intervention) should not result in any upward or downward shifting of the rows. Consequently, the upward- or downward-shifted rows demonstrate that the rows in the original electronic file was either deliberately shifted prior to printing or an intermediate electronic file with shifted rows was used to generate the printout. Ultimately, what modulo arithmetic demonstrates is the fact that the printouts (as shown, with the 11th row always being the only relevant row and the last row being a clean multiple of 21) cannot be directly generated from an un-modified text file.

Section 6: Conclusion

As demonstrated in this paper, in certain types of legal cases, such as collections cases in which banking documents are governed by the U.S.C. and C.F.R., there are specific requirements imposed on the format of the documents (e.g., must be ASCII files, etc.). Because of this, when the bench and bar (having less familiarity with metadata in electronic documents) must determine whether or not paper copies are direct printouts of alleged original electronic files, there are reliable and time-tested mathematical tools available to assist in that determination.

This paper has identified and applied one such reliable mathematical procedure, namely, modulo arithmetic. As demonstrated herein, traditional and relatively simple modulo operations can reliably detect anomalies in manufactured electronic evidence when one knows *a priori* how certain documents must be formatted (as plain-text ASCII files). Although modulo operations, standing alone, can be used to identify within-document mathematical anomalies, that same math can also be used as a redundancy when metadata is available. Furthermore, modulo operations can be used in conjunction with other approaches that demonstrate a deliberate manipulation or alteration of evidence [38].

Insofar as these mathematical tools permit one to reach reasonable conclusions about the actual origins of paper printouts without reference to metadata, and insofar as these mathematical tools confirm the sworn testimony from the very entities that rely on those printed documents, it is clear that conventional mathematics can be applied to detect patterns that suggest (more likely than not) that evidence has been generated from intermediate, manufactured electronic files.

At its core, because basic mathematics (as used in the processes that are described herein) have been time-tested

and shown to be reliable, these mathematical approaches can be implemented independently or as a redundancy (in conjunction with metadata analysis or other processes).

References

1. See, https://www.televisionacademy.com/awards/nominees-winners/2016/outstanding-writing-for-a-variety-series; https://en.wikipedia.org/wiki/List_of_awards_and_nominations_received_by_John_Oliver.
2. Debt Buyers: Last Week with John Oliver, available at https://www.youtube.com/watch?v=hxUAntt1z2c, posted on 2016-Jun-06.
3. See, e.g., Consumer Financial Protection Bureau Sues Debt Collectors and Debt Buyers Encore Capital Group, Midland Funding, Midland Credit Management, and Asset Acceptance Capital Corp., dated 2020-Sep-08, https://www.consumerfinance.gov/about-us/newsroom/cfpb-sues-debt-collectors-and-debt-buyers-encore-capital-group-et-al/.
4. Federal Register, Consumer Financial Protection Bureau, https://www.federalregister.gov/agencies/consumer-financial-protection-bureau (maintained by the National Archives, last downloaded 2025-Oct-30).
5. See, Enforcement Actions, https://www.consumerfinance.gov/enforcement/actions/ (regularly updated); see, also, https://www.consumerfinance.gov/about-us/newsroom/cfpb-sues-debt-relief-companies-illegally-posing-federal-government/; https://www.consumerfinance.gov/about-us/newsroom/consumer-financial-protection-bureau-settles-debt-collector-engaging-deceptive-debt-collection-practices-three-states/; https://www.consumerfinance.gov/about-us/newsroom/consumer-financial-protection-bureau-sues-debt-collector-bounceback-inc/.
6. See, e.g., Payback for a Debt Collector: Illegal, Aggressive Tactics Result in Jail Time, FBI News, https://www.fbi.gov/news/stories/illegal-tactics-result-in-jail-time-for-debt-collector (posted 2017-Jan-13); Key figure in abusive debt collections sentenced to prison: 'Your conduct was motivated by greed,' The Buffalow News, https://buffalonews.com/news/local/crime-courts/article_37e05288-bda9-11ef-9cf0-238cdd4f41b8.html (posted 2024-Dec-30); AG Brnovich Obtains Judgment Permanently Banning Debt Collector & Awarding More Than $1.6 Million in Restitution, Arizona Attorney General News, https://www.azag.gov/press-release/ag-brnovich-obtains-judgment-permanently-banning-debt-collector-awarding-more-16 (posted 2022-May-13); A California debt collector has sued thousands of people - some of them never knew, KPBS News, https://www.kpbs.org/news/local/2023/04/06/a-california-debt-collector-has-sued-thousands-of-people-some-of-them-never-knew (published 2023-Apr-06); Fraud Charges Filed Against Alleged Scammer Seen on 'Nightline,' ABC News, https://abcnews.go.com/Blotter/fraud-charges-filed-alleged-scammer-nightline/story?id=17069702 (published 2012-Aug-23).
7. S. Han, Absence of Evidentiary Value for Layout- and Style-Formatted Paper Documents That Cannot Be Direct Printouts from Original Electronic Bank Files, International Journal of Law, Vol. 11, Issue 11, 2025, pp. 96-103; S. Han, Using Basic Probability to Demonstrate Problems with Paper Printouts from Alleged Original Electronic Documents, Int. J. Civ. Law Legal Res. 2025;5(2):302-308, DOI:10.22271/civillaw.2025.v5.i2d.171; Han, Sam. "Manufactured Evidence in Debt-Collection Cases." Zenodo, November 17, 2015. https://doi.org/10.5281/zenodo.17486296; Han, Sam. "Manufactured Evidence." Zenodo, April 12, 2024. https://doi.org/10.5281/zenodo.17486148.
8. See, e.g., Judgment Entry, 2025-Jul-09, Absolute Resolutions Investments, LLC v. Justin C. Marshall, Case Number A2403270 (Court of Common Pleas, Hamilton County, Ohio); Final Appealable Order, 2025-Jul-28, LVNV Funding, LLC v. Dave Salmon, Case Number CV 2024 04 0735 (Court of Common Pleas, Butler County, Ohio).
9. See, Information for Data Management Plans, Astrobiology Habitable Environments Database (AHED), available at https://ahed.nasa.gov/help/help-data-management-plan (recommending use of Zenodo and providing Universal Resource Locator (URL) link for Zenodo).
10. Modulo, Wikipedia, https://en.wikipedia.org/wiki/Modulo.
11. https://en.wikipedia.org/wiki/Modulo.
12. https://en.wikipedia.org/wiki/Modulo.
13. Multiplication, Wikipedia, https://en.wikipedia.org/wiki/Multiplication; Divisor, Wikipedia, https://en.wikipedia.org/wiki/Divisor.
14. https://en.wikipedia.org/wiki/Divisor.
15. Specifically, the cases are: LVNV Funding, LLC v. Tamika Brown, Case Number 24CV01441 (Municipal Court, Hamilton County, Ohio) (hereinafter, "Brown Case"); LVNV Funding, LLC v. Nancy Duvall, Case Number 23CV28211 (Municipal Court, Hamilton County, Ohio) (hereinafter, "Duvall Case"); LVNV Funding, LLC v. Henry Flowers, Case Number 24CV21667 (Municipal Court, Hamilton Count, Ohio) (hereinafter, "Flowers Case"); LVNV Funding, LLC v. Paul Loveless, Case Number 24CV17562 (Municipal Court, Hamilton County, Ohio) (hereinafter, "Loveless Case"); LVNV Funding, LLC v. Eileen Pike, Case Number 23CV28432 (Municipal Court, Hamilton County, Ohio) (hereinafter, "Pike Case"); LVNV Funding, LLC v. Damien Townsend, Case Number 23CV28432 (Municipal Court, Hamilton County, Ohio) (hereinafter, "Townsend Case"); and LVNV Funding, LLC v. Baron Wynter, Case Number 24CV21026 (Municipal Court, Hamilton County, Ohio) (hereinafter, "Wynter Case").
16. See, e.g., https://doi.org/10.5281/zenodo.17486296 (analyzing documents from Asset Acceptance, LLC); also, https://doi.org/10.5281/zenodo.17486148 (analyzing documents from both Asset Acceptance, LLC and LVNV Funding, LLC across multiple jurisdictions).
17. Municipal Court of Hamilton County, Ohio, U.S.A. "Redacted Exhibit Filed on 2024-Mar-11 in LVNV Funding, LLC v. Tamika Brown, Case Number

24CV01441 (Municipal Court, Hamilton County, Ohio)." Zenodo, March 11, 2024. https://doi.org/10.5281/zenodo.17516637 (hereinafter, "Brown File").
18. Municipal Court of Hamilton County, Ohio, U.S.A. "Redacted Exhibit Filed on 2024-Feb-20 in LVNV Funding, LLC v. Nancy Duvall, Case Number 23CV28211 (Municipal Court, Hamilton County, Ohio)." Zenodo, February 20, 2024. https://doi.org/10.5281/zenodo.17516695 (hereinafter, "Duvall File").
19. Municipal Court of Hamilton County, Ohio, U.S.A. "Redacted Exhibit Filed on 2024-Aug-06 in LVNV Funding, LLC v. Henry Flowers, Case Number 24CV21667 (Municipal Court, Hamilton County, Ohio)." Zenodo, August 6, 2024. https://doi.org/10.5281/zenodo.17516752 (hereinafter, "Flowers File").
20. Municipal Court of Hamilton County, Ohio, U.S.A. "Redacted Exhibit Filed on 2024-Jun-27 in LVNV Funding, LLC v. Paul Loveless, Case Number 24CV17562 (Municipal Court, Hamilton County, Ohio)." Zenodo, June 27, 2024. https://doi.org/10.5281/zenodo.17516772 (hereinafter, "Loveless File").
21. Municipal Court of Hamilton County, Ohio, U.S.A. "Redacted Exhibit Filed on 2024-Feb-20 in LVNV Funding, LLC v. Eileen Pike, Case Number 23CV28432 (Municipal Court, Hamilton County, Ohio)." Zenodo, February 20, 2024. https://doi.org/10.5281/zenodo.17516790 (hereinafter, "Pike File").
22. Municipal Court of Hamilton County, Ohio, U.S.A. "Redacted Exhibit Filed on 2024-Feb-23 in LVNV Funding, LLC v. Damien Townsend, Case Number 23CV28432 (Municipal Court, Hamilton County, Ohio)." Zenodo, February 23, 2024. https://doi.org/10.5281/zenodo.17516846 (hereinafter, "Townsend File").
23. Municipal Court of Hamilton County, Ohio, U.S.A. "Redacted Exhibit Filed on 2024-Jul-31 in LVNV Funding, LLC v. Baron Wynter, Case Number 24CV21026 (Municipal Court, Hamilton County, Ohio)." Zenodo, July 31, 2024. https://doi.org/10.5281/zenodo.17516899 (hereinafter, "Wynter File").
24. For example, two (2) separate witnesses for Asset Acceptance, LLC, confirmed that the 26-line printouts with the relevant data always being found on line-16 were made-for-litigation documents. See, https://doi.org/10.5281/zenodo.17486296 and https://doi.org/10.5281/zenodo.17486148. Similarly, a corporate representative for LVNV Funding, LLC confirmed that original bank documents are text files (i.e., ASCII files) that lack any formatting. See, Hamilton County Court of Common Pleas, Ohio, U.S.A. "Exhibit C to Defendant's First Notice of Filing Exhibits from Daubert Hearing, Filed 2025-Sep-05, LVNV Funding, LLC, V. Joseph Mulholland, Case Number A2401661 (Court of Common Pleas, Hamilton County, Ohio) (Exhibit Highlighting Excerpts from Ohio Civ. R. 30(B)(5) Deposition of LVNV Representative Tonya Henderson)." Zenodo, September 5, 2025. https://doi.org/10.5281/zenodo.17517313.
25. 31 U.S.C. § 5101 ("Decimal System"), available at https://uscode.house.gov/view.xhtml?path=/prelim@title31/subtitle4/chapter51/subchapter1&edition=prelim.
26. 12 C.F.R. § 360.9(d)(1) ("Such standard data files are to be created through a mapping of pre-existing data elements and internal institution codes into standard data formats"), available at National Archives. "12 C.F.R. 360, with Appendices A Through G." Zenodo, November 3, 2025. https://doi.org/10.5281/zenodo.17515489.
27. App. A to 12 C.F.R. § 360 ("The file will be in a tab- or pipe-delimited ASCII format").
28. See, ASCII, Wikipedia, https://en.wikipedia.org/wiki/ASCII; American National Standards Institute (ANSI) Standard for Coded Character Sets - 7-Bit American National Standard Code for Information Interchange (7-Bit ASCII), 1986 (hereinafter, "7-Bit ASCII").
29. App'x. A, B, C, and D to 12 C.F.R. § 360 (requiring data structures to be "Decimal [14,2]").
30. See, https://en.wikipedia.org/wiki/ASCII; 7-Bit ASCII.
31. See, Section 3, supra.
32. See, Section 3, supra.
33. Hamilton County Court of Common Pleas, Ohio, U.S.A. "Exhibit C to Defendant's First Notice of Filing Exhibits from Daubert Hearing, Filed 2025-Sep-05, LVNV Funding, LLC, v. Joseph Mulholland, Case Number A2401661 (Court of Common Pleas, Hamilton County, Ohio) (Exhibit Highlighting Excerpts from Ohio Civ. R. 30(B)(5) Deposition of LVNV Representative Tonya Henderson)." Zenodo, September 5, 2025. https://doi.org/10.5281/zenodo.17517313.
34. Hamilton County Court of Common Pleas, Ohio, U.S.A. "Exhibit C to Defendant's First Notice of Filing Exhibits from Daubert Hearing, Filed 2025-Sep-05, LVNV Funding, LLC, v. Joseph Mulholland, Case Number A2401661 (Court of Common Pleas, Hamilton County, Ohio) (Exhibit Highlighting Excerpts from Ohio Civ. R. 30(B)(5) Deposition of LVNV Representative Tonya Henderson)." Zenodo, September 5, 2025. https://doi.org/10.5281/zenodo.17517313.
35. Hamilton County Court of Common Pleas, Ohio, U.S.A. "Exhibit C to Defendant's First Notice of Filing Exhibits from Daubert Hearing, Filed 2025-Sep-05, LVNV Funding, LLC, v. Joseph Mulholland, Case Number A2401661 (Court of Common Pleas, Hamilton County, Ohio) (Exhibit Highlighting Excerpts from Ohio Civ. R. 30(B)(5) Deposition of LVNV Representative Tonya Henderson)." Zenodo, September 5, 2025. https://doi.org/10.5281/zenodo.17517313.
36. Hamilton County Court of Common Pleas, Ohio, U.S.A. "Exhibit C to Defendant's First Notice of Filing Exhibits from Daubert Hearing, Filed 2025-Sep-05, LVNV Funding, LLC, v. Joseph Mulholland, Case Number A2401661 (Court of Common Pleas, Hamilton County, Ohio) (Exhibit Highlighting Excerpts from Ohio Civ. R. 30(B)(5) Deposition of LVNV Representative Tonya Henderson)." Zenodo, September 5, 2025. https://doi.org/10.5281/zenodo.17517313.
37. Hamilton County Court of Common Pleas, Ohio, U.S.A. "Exhibit C to Defendant's First Notice of Filing Exhibits from Daubert Hearing, Filed 2025-Sep-05, LVNV Funding, LLC, v. Joseph Mulholland, Case Number A2401661 (Court of Common Pleas, Hamilton

County, Ohio) (Exhibit Highlighting Excerpts from Ohio Civ. R. 30(B)(5) Deposition of LVNV Representative Tonya Henderson)." Zenodo, September 5, 2025. https://doi.org/10.5281/zenodo.17517313.

38. See, e.g., S. Han, Absence of Evidentiary Value for Layout- and Style-Formatted Paper Documents That Cannot Be Direct Printouts from Original Electronic Bank Files, International Journal of Law, Vol. 11, Issue 11, 2025, pp. 96-103; see, also, S. Han, Using Basic Probability to Demonstrate Problems with Paper Printouts from Alleged Original Electronic Documents, Int. J. Civ. Law Legal Res. 2025;5(2):302-308, DOI:10.22271/civillaw.2025.v5.i2d.171.