

Results of calculations for numbers in IEEE 754 standard and NPAt format

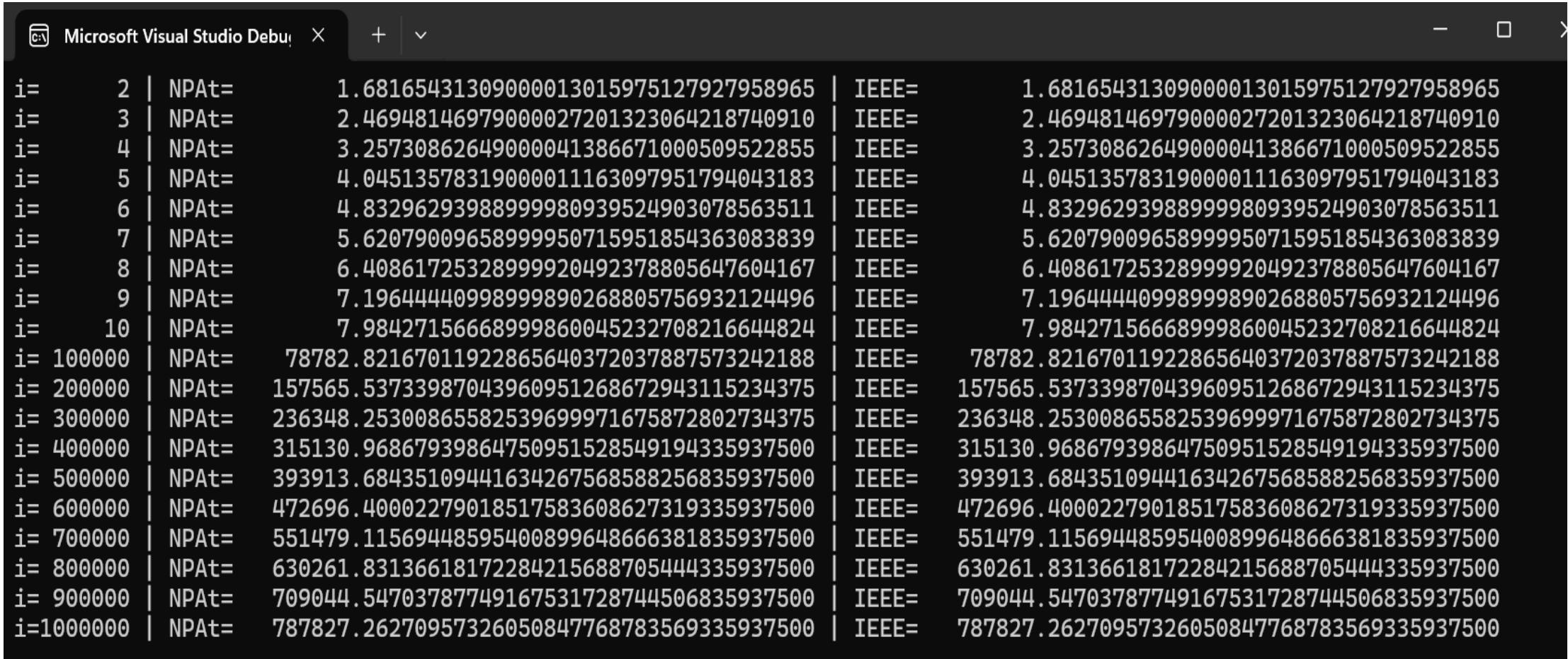
**Comparative results of summing signed decimal numbers according to
the standard IEEE 754 algorithm and summation in NPAt format.**

The terminal screenshots show the output data obtained using the
demonstration algorithm npap-algorithm.cpp

1. Sum of $x_1 = -0.89382715639$ with 999999 additions of $x_2 = 0.7878271567$

Microsoft Visual Studio Debug					
i= 2 NPAt=	-0.10599999968999995747509501597960480	IEEE=	-0.10599999968999995747509501597960480		
i= 3 NPAt=	0.68182715701000007335608188441256061	IEEE=	0.68182715701000007335608188441256061		
i= 4 NPAt=	1.46965431371000021520956124732038006	IEEE=	1.4696543137099999316495632228907198		
i= 5 NPAt=	2.25748147041000013501843568519689143	IEEE=	2.25748147041000013501843568519689143		
i= 6 NPAt=	3.04530862711000027687191504810471088	IEEE=	3.04530862711000027687191504810471088		
i= 7 NPAt=	3.83313578381000041872539441101253033	IEEE=	3.83313578381000041872539441101253033		
i= 8 NPAt=	4.62096294051000011648966392385773361	IEEE=	4.62096294051000011648966392385773361		
i= 9 NPAt=	5.40879009720999981425393343670293689	IEEE=	5.40879009720999981425393343670293689		
i= 10 NPAt=	6.19661725390999951201820294954814017	IEEE=	6.19661725390999951201820294954814017		
i= 100000 NPAt=	78781.03401580645004287362098693847656250	IEEE=	78781.03401580645004287362098693847656250		
i= 200000 NPAt=	157563.74968555770465172827243804931640625	IEEE=	157563.74968555770465172827243804931640625		
i= 300000 NPAt=	236346.46535434309043921530246734619140625	IEEE=	236346.46535434309043921530246734619140625		
i= 400000 NPAt=	315129.18102508585434406995773315429687500	IEEE=	315129.18102508585434406995773315429687500		
i= 500000 NPAt=	393911.89669678162317723035812377929687500	IEEE=	393911.89669678162317723035812377929687500		
i= 600000 NPAt=	472694.61236847739201039075851440429687500	IEEE=	472694.61236847739201039075851440429687500		
i= 700000 NPAt=	551477.32804017316084355115890502929687500	IEEE=	551477.32804017316084355115890502929687500		
i= 800000 NPAt=	630260.04371186892967671155929565429687500	IEEE=	630260.04371186892967671155929565429687500		
i= 900000 NPAt=	709042.75938356469850987195968627929687500	IEEE=	709042.75938356469850987195968627929687500		
i=1000000 NPAt=	787825.47505526046734303236007690429687500	IEEE=	787825.47505526046734303236007690429687500		

2. Sum of $x_1 = 0.89382715639$ with 999999
additions of $x_2 = 0.7878271567$



The screenshot shows a Microsoft Visual Studio Debug window with the title "Microsoft Visual Studio Debug". The window displays a list of floating-point additions. Each row consists of two columns of floating-point numbers separated by a vertical pipe character (|). The first column contains the value of i , the second column contains the value of $NPAt$, and the third column contains the IEEE representation of the sum. The values in the first two columns increase sequentially from 2 to 1,000,000. The IEEE representations remain constant at 787827.26270957326050847768783569335937500.

$i=$	$NPAt=$	IEEE=
2	1.68165431309000013015975127927958965	1.68165431309000013015975127927958965
3	2.46948146979000027201323064218740910	2.46948146979000027201323064218740910
4	3.25730862649000041386671000509522855	3.25730862649000041386671000509522855
5	4.04513578319000011163097951794043183	4.04513578319000011163097951794043183
6	4.83296293988999980939524903078563511	4.83296293988999980939524903078563511
7	5.62079009658999950715951854363083839	5.62079009658999950715951854363083839
8	6.40861725328999920492378805647604167	6.40861725328999920492378805647604167
9	7.19644440998999890268805756932124496	7.19644440998999890268805756932124496
10	7.98427156668999860045232708216644824	7.98427156668999860045232708216644824
100000	78782.82167011922865640372037887573242188	78782.82167011922865640372037887573242188
200000	157565.53733987043960951268672943115234375	157565.53733987043960951268672943115234375
300000	236348.25300865582539699971675872802734375	236348.25300865582539699971675872802734375
400000	315130.96867939864750951528549194335937500	315130.96867939864750951528549194335937500
500000	393913.68435109441634267568588256835937500	393913.68435109441634267568588256835937500
600000	472696.40002279018517583608627319335937500	472696.40002279018517583608627319335937500
700000	551479.11569448595400899648666381835937500	551479.11569448595400899648666381835937500
800000	630261.83136618172284215688705444335937500	630261.83136618172284215688705444335937500
900000	709044.54703787749167531728744506835937500	709044.54703787749167531728744506835937500
i=1000000	787827.26270957326050847768783569335937500	787827.26270957326050847768783569335937500

3. Sum of $x_1 = 89382715639$ with 999999
additions of $x_2 = 7878271567$

Microsoft Visual Studio Debug					
i=	2	NPAt=	97260987206.0	IEEE=	97260987206.0
i=	3	NPAt=	105139258773.0	IEEE=	105139258773.0
i=	4	NPAt=	113017530340.0	IEEE=	113017530340.0
i=	5	NPAt=	120895801907.0	IEEE=	120895801907.0
i=	6	NPAt=	128774073474.0	IEEE=	128774073474.0
i=	7	NPAt=	136652345041.0	IEEE=	136652345041.0
i=	8	NPAt=	144530616608.0	IEEE=	144530616608.0
i=	9	NPAt=	152408888175.0	IEEE=	152408888175.0
i=	10	NPAt=	160287159742.0	IEEE=	160287159742.0
i=	100000	NPAt=	787908661144072.0	IEEE=	787908661144072.0
i=	200000	NPAt=	1575735817844072.0	IEEE=	1575735817844072.0
i=	300000	NPAt=	2363562974544072.0	IEEE=	2363562974544072.0
i=	400000	NPAt=	3151390131244072.0	IEEE=	3151390131244072.0
i=	500000	NPAt=	3939217287944072.0	IEEE=	3939217287944072.0
i=	600000	NPAt=	4727044444644072.0	IEEE=	4727044444644072.0
i=	700000	NPAt=	5514871601344072.0	IEEE=	5514871601344072.0
i=	800000	NPAt=	6302698758044072.0	IEEE=	6302698758044072.0
i=	900000	NPAt=	7090525914744072.0	IEEE=	7090525914744072.0
i=	1000000	NPAt=	7878353071444072.0	IEEE=	7878353071444072.0

4. Sum of $x_1 = 89382715639e+15$ with
999999 additions of $x_2 = 7878271567e+23$

```
i=    2 | NPAt=787827246082715723239632899407872.0 | IEEE=787827246082715723239632899407872.0  
i=    3 | NPAt=787827335465431410931775993544704.0 | IEEE=787827335465431410931775993544704.0  
i=    4 | NPAt=787827424848147098623919087681536.0 | IEEE=787827424848147098623919087681536.0  
i=    5 | NPAt=787827514230862786316062181818368.0 | IEEE=787827514230862786316062181818368.0  
i=    6 | NPAt=787827603613578474008205275955200.0 | IEEE=787827603613578474008205275955200.0  
i=    7 | NPAt=787827692996294161700348370092032.0 | IEEE=787827692996294161700348370092032.0  
i=    8 | NPAt=787827782379009849392491464228864.0 | IEEE=787827782379009849392491464228864.0  
i=    9 | NPAt=787827871761725537084634558365696.0 | IEEE=787827871761725537084634558365696.0  
i=   10 | NPAt=787827961144441224776777652502528.0 | IEEE=787827961144441224776777652502528.0  
i= 100000 | NPAt=796765338886053562164760394334208.0 | IEEE=796765338886053562164760394334208.0  
i= 200000 | NPAt=805703610454822776474174077534208.0 | IEEE=805703610454822776474174077534208.0  
i= 300000 | NPAt=814641882023591990783587760734208.0 | IEEE=814641882023591990783587760734208.0  
i= 400000 | NPAt=823580153592361205093001443934208.0 | IEEE=823580153592361205093001443934208.0  
i= 500000 | NPAt=832518425161130419402415127134208.0 | IEEE=832518425161130419402415127134208.0  
i= 600000 | NPAt=841456696729899633711828810334208.0 | IEEE=841456696729899633711828810334208.0  
i= 700000 | NPAt=850394968298668848021242493534208.0 | IEEE=850394968298668848021242493534208.0  
i= 800000 | NPAt=859333239867438062330656176734208.0 | IEEE=859333239867438062330656176734208.0  
i= 900000 | NPAt=868271511436207276640069859934208.0 | IEEE=868271511436207276640069859934208.0
```

5. Sum of $x_1 = 838.678$ with 9999999
additions of $x_2 = 7.87827e+76.236$

Microsoft Visual Studio Debug					
i=	NPAt=	914.91399999999987267074175179005	IEEE=	914.91399999999987267074175179005	
i=	3 NPAt=	991.14999999999977262632455676794	IEEE=	991.14999999999977262632455676794	
i=	4 NPAt=	1067.38599999999967258190736174583	IEEE=	1067.38599999999967258190736174583	
i=	5 NPAt=	1143.622000000000070940586738288403	IEEE=	1143.622000000000070940586738288403	
i=	6 NPAt=	1219.858000000000174622982740402222	IEEE=	1219.858000000000174622982740402222	
i=	7 NPAt=	1296.094000000000278305378742516041	IEEE=	1296.094000000000278305378742516041	
i=	8 NPAt=	1372.330000000000381987774744629860	IEEE=	1372.330000000000381987774744629860	
i=	9 NPAt=	1448.566000000000485670170746743679	IEEE=	1448.566000000000485670170746743679	
i=	10 NPAt=	1524.802000000000589352566748857498	IEEE=	1524.802000000000589352566748857498	
i= 100000 NPAt=	7624362.441982096992433071136474609375	IEEE=	7624362.441982096992433071136474609375		
i= 200000 NPAt=	15247962.441938884556293487548828125000	IEEE=	15247962.441938884556293487548828125000		
i= 300000 NPAt=	22871562.442044571042060852050781250000	IEEE=	22871562.442044571042060852050781250000		
i= 400000 NPAt=	30495162.442187622189521789550781250000	IEEE=	30495162.442187622189521789550781250000		
i= 500000 NPAt=	38118762.442330673336982727050781250000	IEEE=	38118762.442330673336982727050781250000		
i= 600000 NPAt=	45742362.442473724484443664550781250000	IEEE=	45742362.442473724484443664550781250000		
i= 700000 NPAt=	53365962.442616775631904602050781250000	IEEE=	53365962.442616775631904602050781250000		
i= 800000 NPAt=	60989562.442759826779365539550781250000	IEEE=	60989562.442759826779365539550781250000		
i= 900000 NPAt=	68613162.442902877926826477050781250000	IEEE=	68613162.442902877926826477050781250000		
i=1000000 NPAt=	76236762.443045929074287414550781250000	IEEE=	76236762.443045929074287414550781250000		

6. Sum of $x_1 = 1234$ with 999999 additions of
 $x_2 = 765432$

Microsoft Visual Studio Debug					
i=	NPAt=	766666.000	IEEE=	766666.000	
i= 2	NPAt=	767900.000	IEEE=	767900.000	
i= 3	NPAt=	769134.000	IEEE=	769134.000	
i= 4	NPAt=	770368.000	IEEE=	770368.000	
i= 5	NPAt=	771602.000	IEEE=	771602.000	
i= 6	NPAt=	772836.000	IEEE=	772836.000	
i= 7	NPAt=	774070.000	IEEE=	774070.000	
i= 8	NPAt=	775304.000	IEEE=	775304.000	
i= 9	NPAt=	776538.000	IEEE=	776538.000	
i= 10	NPAt=	124164198.000	IEEE=	124164198.000	
i= 100000	NPAt=	247564198.000	IEEE=	247564198.000	
i= 200000	NPAt=	370964198.000	IEEE=	370964198.000	
i= 300000	NPAt=	494364198.000	IEEE=	494364198.000	
i= 400000	NPAt=	617764198.000	IEEE=	617764198.000	
i= 500000	NPAt=	741164198.000	IEEE=	741164198.000	
i= 600000	NPAt=	864564198.000	IEEE=	864564198.000	
i= 700000	NPAt=	987964198.000	IEEE=	987964198.000	
i= 800000	NPAt=	1111364198.000	IEEE=	1111364198.000	
i= 900000	NPAt=	1234764198.000	IEEE=	1234764198.000	
i=1000000	NPAt=	1234764198.000	IEEE=	1234764198.000	

7. Sum of $x_1 = -8.93827e+10$ with 99999 additions
of $x_2 = 7.87827e+09$

Microsoft Visual Studio Debug					
i=	NPAt=	-8638.000	IEEE=	-8638.000	
i= 2 NPAt=	-7404.000	IEEE=	-7404.000		
i= 3 NPAt=	-6170.000	IEEE=	-6170.000		
i= 4 NPAt=	-4936.000	IEEE=	-4936.000		
i= 5 NPAt=	-3702.000	IEEE=	-3702.000		
i= 6 NPAt=	-2468.000	IEEE=	-2468.000		
i= 7 NPAt=	-1234.000	IEEE=	-1234.000		
i= 8 NPAt=	0.000	IEEE=	0.000		
i= 9 NPAt=	1234.000	IEEE=	1234.000		
i= 10 NPAt=	123388894.000	IEEE=	123388894.000		
i= 100000 NPAt=	246788894.000	IEEE=	246788894.000		
i= 200000 NPAt=	370188894.000	IEEE=	370188894.000		
i= 300000 NPAt=	493588894.000	IEEE=	493588894.000		
i= 400000 NPAt=	616988894.000	IEEE=	616988894.000		
i= 500000 NPAt=	740388894.000	IEEE=	740388894.000		
i= 600000 NPAt=	863788894.000	IEEE=	863788894.000		
i= 700000 NPAt=	987188894.000	IEEE=	987188894.000		
i= 800000 NPAt=	1110588894.000	IEEE=	1110588894.000		
i= 900000 NPAt=	1233988894.000	IEEE=	1233988894.000		
i=1000000 NPAt=					

END