## Ruby master - Bug #17731

### Integer downflow with inject/reduce

03/19/2021 12:37 AM - gaojun (Jun Gao)

<table>
<thead>
<tr>
<th><strong>Status:</strong></th>
<th>Closed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Priority:</strong></td>
<td>Normal</td>
</tr>
<tr>
<td><strong>Assignee:</strong></td>
<td>marcandre (Marc-Andre Lafortune)</td>
</tr>
<tr>
<td><strong>Target version:</strong></td>
<td>ruby 3.0.0p0 (2020-12-25 revision 95aff21468) [x86_64-linux]</td>
</tr>
<tr>
<td><strong>Backport:</strong></td>
<td>2.5: REQUIRED, 2.6: REQUIRED, 2.7: DONE, 3.0: DONE</td>
</tr>
</tbody>
</table>

### Description

Test case:

```ruby
[-2305843009213693953,-2305843009213693953,-2305843009213693953].inject(:+)
or
([-2**61-1] * 3).inject(:+)
```

Expected Result:

-6917529027641081859

Actual Result:

11529215046068469757

Some clues:

- Downflow seems not happen if there are only two elements in Array
- The sample above works fine in [https://try.ruby-lang.org/](https://try.ruby-lang.org/)
- `[-2305843009213693953,-2305843009213693953,-2305843009213693953].sum` can get the correct result
- `([-2**61] * 3).inject(+)` can get the correct result

### Affected Versions:

- ruby 3.0.0p0 (2020-12-25 revision 95aff21468) [x86_64-linux]
- ruby 2.7.2p137 (2020-10-01 revision 5445e04352) [x86_64-linux]
- ruby 2.6.6p146 (2020-03-31 revision 67876) [x86_64-linux]

### Associated revisions

**Revision a85ed626 - 03/19/2021 04:21 AM - Marc-Andre Lafortune**

Fix Enumerable#inject with high negative fixnums [Bug #17731]

**Revision 364c8595 - 03/20/2021 07:16 AM - nagachika (Tomoyuki Chikanaga)**

merge revision(s) a85ed626f18d1014d09fb37eb0a703976c3d2b53: [Backport #17731]

```
---
enum.c ------------ | 2 +-
test/ruby/test_enum.rb | 2 ++
2 files changed, 3 insertions(+), 1 deletion(-)
```

**Revision 855401da - 04/02/2021 03:31 AM - naruse (Yui NARUSE)**

merge revision(s) a85ed626f18d1014d09fb37eb0a703976c3d2b53: [Backport #17731]

```
---
enum.c ------------ | 2 +-
test/ruby/test_enum.rb | 2 ++
2 files changed, 3 insertions(+), 1 deletion(-)
```

### History

**#1 - 03/19/2021 01:01 AM - gaojun (Jun Gao)**
Some more interesting samples:
3.0.0 :001 > [0,-2305843009213693953,-2305843009213693953].inject(+) => 13835058055282163710
3.0.0 :002 > [-2305843009213693953,-2305843009213693953].inject(+) => -4611686018427387906
3.0.0 :003 > [-2305843009213693953,-2305843009213693953,0].inject(+) => -4611686018427387906

#2 - 03/19/2021 01:05 AM - Hanmac (Hans Mackowiak)

more interesting samples:
[-2305843009213693953,-2305843009213693953,-2305843009213693953].inject(+) => 11529215046068469757
[-2305843009213693953,-2305843009213693953,-2305843009213693953].inject(&+) => -6917529027641081859

#3 - 03/19/2021 03:22 AM - marcandre (Marc-Andre Lafortune)

- Assignee set to marcandre (Marc-Andre Lafortune)

Right, there's a ULONG2NUM that seem to assume the subtotal is always positive...
I'll make a PR for this

#4 - 03/19/2021 03:34 AM - marcandre (Marc-Andre Lafortune)

- Backport changed from 2.5: UNKNOWN, 2.6: UNKNOWN, 2.7: UNKNOWN, 3.0: UNKNOWN to 2.5: REQUIRED, 2.6: REQUIRED, 2.7: REQUIRED, 3.0: REQUIRED

Removing the letter 'U' fixes it...
https://github.com/ruby/ruby/pull/4288

#5 - 03/19/2021 03:38 AM - akr (Akira Tanaka)

marcandre (Marc-Andre Lafortune) wrote in #note-3:

Right, there's a ULONG2NUM that seem to assume the subtotal is always positive...
I'll make a PR for this

akr (Akira Tanaka) wrote in #note-5:

nobu changed it from LONG2NUM to ULONG2NUM at
https://github.com/ruby/ruby/commit/6bb70c11b344dee0739c6fb7bfb0ea124b5225b6

Thanks.
The other changes were for counts (always positive) and most were considered as integers. In the inject case, the values can be any fixnum, including negative ones, so that change was a bug. Now fixed.

#7 - 03/19/2021 04:40 AM - marcandre (Marc-Andre Lafortune)

akr (Akira Tanaka) wrote in #note-5:

Fix Enumerable#inject with high negative fixnums [Bug #17731]

#8 - 03/20/2021 07:31 AM - nagachika (Tomoyuki Chikanaga)

- Backport changed from 2.5: REQUIRED, 2.6: REQUIRED, 2.7: REQUIRED, 3.0: REQUIRED to 2.5: REQUIRED, 2.6: REQUIRED, 2.7: DONE, 3.0: REQUIRED

ruby_2_7 364c8595884808315aaec9605bf2423963ed81c0 merged revision(s) a85ed626f18d1014d09fb37eb0a703976c3d2b53.

08/05/2021
Backport changed from 2.5: REQUIRED, 2.6: REQUIRED, 2.7: DONE, 3.0: REQUIRED to 2.5: REQUIRED, 2.6: REQUIRED, 2.7: DONE, 3.0: DONE

ruby_3_0 855401da495117fcf5d258fe43b71010abc43d9a merged revision(s) a85ed626f18d1014d09fb37eb0a703976c3d2b53.