Aside: Binary Numbers and Overflow

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*We’ve all heard that computers talk in 0s and 1s, but what does that really mean?   
Why do they do it? What does it get us; what does it cost us?*

Say I give you a flag.

You need to communicate your ice cream order to a friend.

What can you say with just that flag?

Unlike yesterday, you are allowed to chat… but one time only.

Say I give you two flags.

What can you say now?

Say I give you the menu of the Cornell Dairy Ice Cream Bar.

How many flags do you need in order to get your order across?

Similar stuff is going on inside of a computer!

We need flag-values for:

the 26 letters, the ten digits

punctuation and symbols

accent/sound signifiers   
But wait! It’s a big world! We want to represent it *all*!

Many computers look at 32 flags at a time. 232 > 4.2 billion.

Some do 64 flags: 18 followed by 18 zeroes.

But let’s focus on three flags for now.

We can give flag-values to some numbers, without repetition or confusion:

000 = 0

001 = 1

010 = 2

011 = 3

100 = 4

101 = 5

110 = 6

111 = 7

Let’s do some math.   
Addition, subtraction, multiplication/division by two.

But what happens if we count too far?

How do we work with negative numbers?

And *now* what happens if we count too far?