The term **arithmetic overflow** or simply **overflow** has the following meanings.

1. In a [computer](https://en.wikipedia.org/wiki/Computer), the condition that occurs when a calculation produces a result that is greater in magnitude than that which a given [register](https://en.wikipedia.org/wiki/Processor_register) or [storage](https://en.wikipedia.org/wiki/Computer_storage) location can store or represent.
2. In a computer, the amount by which a calculated value is greater in magnitude than that which a given register or storage location can store or represent. Note that the overflow may be placed at another location.

Most computers distinguish between two kinds of overflow conditions. A [carry](https://en.wikipedia.org/wiki/Carry_%28arithmetic%29) occurs when the result of an addition or subtraction, considering the operands and result as unsigned numbers, does not fit in the result. Therefore, it is useful to check the [carry flag](https://en.wikipedia.org/wiki/Carry_flag) after adding or subtracting numbers that are interpreted as unsigned values. An *overflow* proper occurs when the result does not have the sign that one would predict from the signs of the operands (e.g. a negative result when adding two positive numbers). Therefore, it is useful to check the [overflow flag](https://en.wikipedia.org/wiki/Overflow_flag) after adding or subtracting numbers that are represented in [two's complement](https://en.wikipedia.org/wiki/Two%27s_complement) form (i.e. they are considered signed numbers).

There are several methods of handling overflow:

1. Avoidance: by carefully ordering operations, checking operands in advance and selecting the correct data type, it is possible to ensure that the result will never be larger than can be stored.
2. Handling: If it is anticipated that overflow may occur and when it happens detected and other processing done. Example: it is possible to add two numbers each two bytes wide using just a byte addition in steps: first add the low bytes then add the high bytes, but if it is necessary to carry out of the low bytes this is arithmetic overflow of the byte addition and it necessary to detect and increment the sum of the high bytes. [CPUs](https://en.wikipedia.org/wiki/Central_processing_unit) generally have a way of detecting this to support addition of numbers larger than their register size, typically using a status bit.
3. Propagation: if a value is too large to be stored it can be assigned a special value indicating that overflow has occurred and then have all successive operation return this flag value. This is useful so that the problem can be checked for once at the end of a long calculation rather than after each step. This is often supported in Floating Point Hardware called [FPUs](https://en.wikipedia.org/wiki/Floating_point_unit).
4. An overflow condition may be ignored, particularly if the possibility has not been anticipated, but this gives incorrect results and can compromise a program's reliability and [security](https://en.wikipedia.org/wiki/Software_security).

[Division by zero](https://en.wikipedia.org/wiki/Division_by_zero) is *not* a form of arithmetic overflow. Mathematically, division by zero within [reals](https://en.wikipedia.org/wiki/Real_numbers) is explicitly [undefined](https://en.wikipedia.org/wiki/Defined_and_undefined).

**Overflow bugs**

Unanticipated arithmetic overflow is a fairly common cause of [program errors](https://en.wikipedia.org/wiki/Software_bug). Such overflow bugs may be hard to discover and diagnose because they may manifest themselves only for very large input data sets, which are less likely to be used in validation tests.[[1]](https://en.wikipedia.org/wiki/Arithmetic_overflow#cite_note-1)

For example, an unhandled arithmetic overflow in the engine steering software was the primary cause of the crash of the 1996 maiden flight of the [Ariane 5](https://en.wikipedia.org/wiki/Ariane_5_Flight_501) rocket.[[2]](https://en.wikipedia.org/wiki/Arithmetic_overflow#cite_note-2) The software had been considered bug-free since it had been used in many previous flights, but those used smaller rockets which generated lower acceleration than Ariane 5.