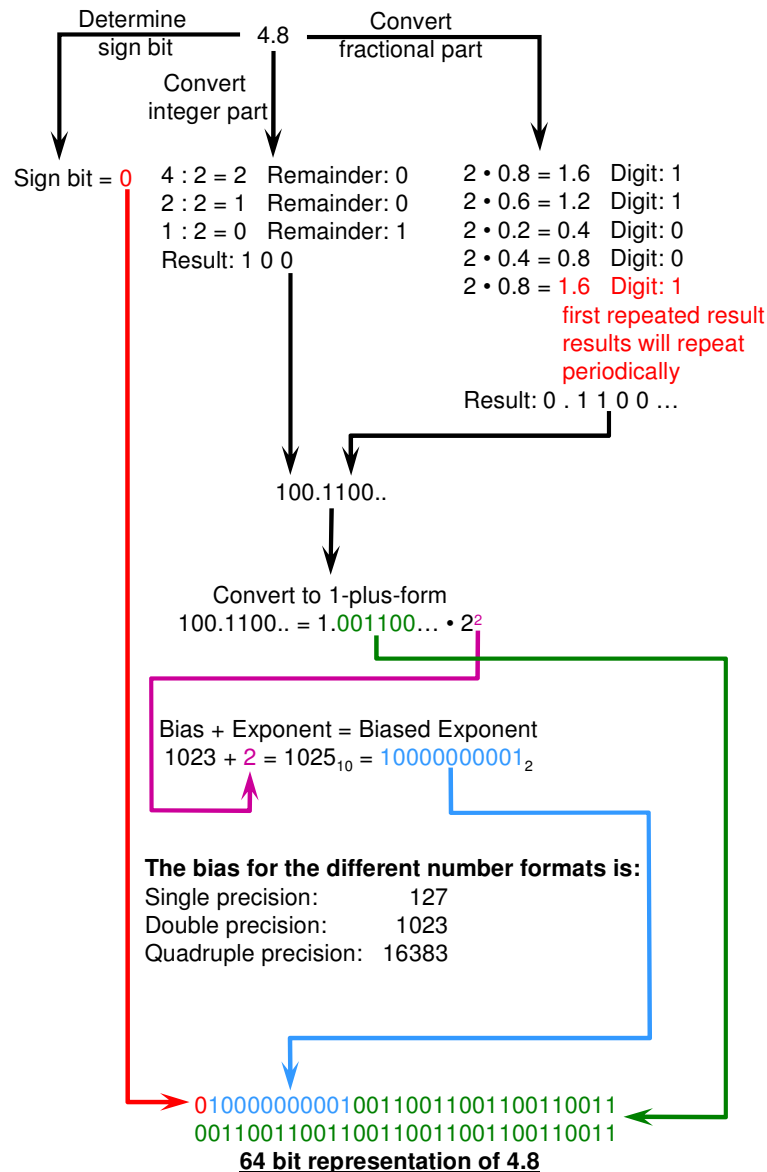


Why 4.8 minus 4.6 is not always equal to 0.2

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More Info

Details are described in
Pharmaceutical Programming,
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Why $4.8 - 4.6$ is not equal to 0.2

[illegible]

This leads to the following issue

```
data example;  
  if 4.8 - 4.6 eq 0.2 then equal = "Y";  
  else equal = "N";  
  
  put equal=;  
  
run;  
  
LOG:  
EQUAL=N
```

Difference in the last 6 bits
due to calculation with unprecise numbers
(the fractional part of 4.8 and 4.6 can only
be represented with infinite numbers in
the binary system and is truncated when stored).

Example of SAS code to avoid numeric precision problems:

Use round function:

```
data example2;  
  if round(4.8 - 4.6, 0.1) eq 0.2 then equal = "Y";  
  else equal = "N";  
  
  put equal=;  
run;  
  
LOG:  
EQUAL=Y
```

Use PROC COMPARE option „method=ABSOLUTE“:

```
proc compare base=work.a compare=work.b method=ABSOLUTE;
run;
```

```

The COMPARE Procedure
  Comparison of WORK.A with WORK.B
  (Method=ABSOLUTE, Criterion=0.00001)

  Data Set Summary

Dataset          Created          Modified   NVar      NObs
WORK.A          23SEP11:16:06:46  23SEP11:16:06:46    1         1
WORK.B          23SEP11:16:06:46  23SEP11:16:06:46    1         1

  Variables Summary

  Number of Variables in Common: 1.

  Observation Summary

Observation      Base      Compare
First Obs              1          1
Last Obs              1          1

Number of Observations in Common: 1.
Total Number of Observations Read from WORK.A: 1.
Total Number of Observations Read from WORK.B: 1.
Number of Observations with Some Compared Variables Unequal: 0.
Number of Observations with All Compared Variables Equal: 1.

```

Values Comparison Summary

Number of Variables Compared with All Observations Equal: 1.
Number of Variables Compared with Some Observations Unequal: 0.
Total Number of Values which Compare Unequal: 0.
Total Number of Values not EXACTLY Equal: 1.
Maximum Difference: 1.6653E-16.

Function	Syntax
CEIL	CEIL(argument)
CEILZ	CEILZ(argument)
FLOOR	FLOOR(argument)
FLOORZ	FLOORZ(argument)
FUZZ	FUZZ(argument)
INT	INT(argument)
INTZ	INTZ(argument)
MOD	MOD(argument-1, argument-2)
MODZ	MODZ(argument-1, argument-2)
ROUND	ROUND(argument <,rounding-unit>)
ROUNDE	ROUNDE(argument <,rounding-unit>)
ROUNDZ	ROUNDZ(argument <,rounding-unit>)

Summary

Numeric precision and representation issues are well known and often forgotten (especially while programming). These issues do not only occur in SAS but rather origin from the technical limitation of storing floating point numbers in the binary system. Numeric precision problems should be taken into account during programming to avoid lengthy searches for errors.