1. Machine epsilon for this 9-bit floating-point number would be half the difference between the following floats: 000000000 and 000000001

This can be found as

= ((-1)^0 x 2^(1-3) x 0.00001 - (-1)^0 x 2^(1-3) x 0.00000)/2 =

= (0.0000001 – 0.0000000)/2 = 0.00000001\_2

= 2 ^-8

= 0.00390625

1. The following were calculated:
2. 0 110 11111

= 2^(2^2+2^1 – 3) x 1.11111

= 1111.112

= 24 + 23 +…+2-2

= 15.7510

1. 0 001 00001

= 2^(1-3) x 1.00001

= .01000012

= 2-2 + 2-7

= 0.257812510

1. 0 000 11111

= 21-3 x 0.11111

= 0.0011111­2

= 2-3 +…+ 2-7

= 0.242187510

1. 0 000 00001

= 21-3 x 0.00001

= 0.00000012

= 2-7

= 0.000007812510



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Number in Binary | Exponential | Exponential  Binary | Binary Float Representation |
| 0 | 0 | 0 | 000 | 0 000 00000 |
| 1 | 1 | 0+3 | 011 | 0 011 00000 |
| 2 | 10 | 1+3 | 100 | 0 100 00000 |
| 3 | 11 | 1+3 | 100 | 0 100 10000 |
| 4 | 100 | 2+3 | 101 | 0 101 00000 |
| 5 | 101 | 2+3 | 101 | 0 101 01000 |
| 6 | 110 | 2+3 | 101 | 0 101 10000 |
| 7 | 111 | 2+3 | 101 | 0 101 11000 |
| 8 | 1000 | 3+3 | 110 | 0 110 00000 |
| 9 | 1001 | 3+3 | 110 | 0 110 00100 |
| 10 | 1010 | 3+3 | 110 | 0 110 01000 |
| 11 | 1011 | 3+3 | 110 | 0 110 01100 |
| 12 | 1100 | 3+3 | 110 | 0 110 10000 |
| 13 | 1101 | 3+3 | 110 | 0 110 10100 |
| 14 | 1110 | 3+3 | 110 | 0 110 11000 |
| 15 | 1111 | 3+3 | 110 | 0 110 11100 |