Machine precision number eps

(i) Machine precesion for float is the smallest floating point number that can not increment any value when added to it i.e. $x + \epsilon = x$.

Machine precision eps for c float data type is obtained by following code

```
#include <stdio.h>

#include <stdlib.h>

#include <float.h>

main()

{

Printf(“eps= %e”, FLT_EPSILON);

}
```

Answer comes out to be **1.192093e-007**.

(ii) Actually π is considered as rounded off value.

So $rd(\pi) = \pi(1 + \epsilon)$ where ϵ is the machine precision.

Hence relative error is $\left|\frac{\pi - rd(\pi)}{\pi}\right| = \pi \times \epsilon$.

this can be computed as follows:

```
#include <stdio.h>
#include <stdlib.h>
#include <float.h>
#include <math.h>
void main()
{
  printf("rounded off error in pi is: %e.\n",M_PI*FLT_EPSILON);
 }
```

Answer comes out to 3.745070e-007.

(iii) There is no relative round off error in 2.0 because it is of int type. It has no rounding off phenomenon , so no round off errors i.e. 0.

(iv) Yes both π and 2 are machine number since $\pi = 0.314$______ $\times 10^{1}$ and $2.0 = 0.2 \times 10^{1}$. .