10. x&(x-1)==0, see The Green Book P182.

15. find online implementation.

www.geeksforgeeks.org/**program**-to-**efficiently**-**calculate**-**ex**/

Efficient program to calculate e^x

The value of [Exponential Function](http://en.wikipedia.org/wiki/Exponential_function) e^x can be expressed using following [Taylor Series](http://en.wikipedia.org/wiki/Taylor_series).

e^x = 1 + x/1! + x^2/2! + x^3/3! + ......

*How to efficiently calculate the sum of above series?*  
The series can be re-written as

e^x = 1 + (x/1) (1 + (x/2) (1 + (x/3) (........) ) )

Let the sum needs to be calculated for n terms, we can calculate sum using following loop.

for (i = n - 1, sum = 1; i > 0; --i )

sum = 1 + x \* sum / i;

Following is implementation of the above idea.

|  |
| --- |
| // Efficient program to calculate e raise to the power x  #include <stdio.h>    //Returns approximate value of e^x using sum of first n terms of Taylor Series  float exponential(int n, float x)  {      float sum = 1.0f; // initialize sum of series        for (int i = n - 1; i > 0; --i )          sum = 1 + x \* sum / i;        return sum;  }    // Driver program to test above function  int main()  {      int n = 10;      float x = 1.0f;      printf("e^x = %f", exponential(n, x));  return 0;  } |