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Probability Research 3

I created a program using C++ to generate the following data.

Note: I've attached code at the end.

1) **Exponential Distribution, lamda = 0.3**
2) **Normal Distribution, Mean = 2.0, SD = 1.0**

```
f(-20) = 121.029,       f(-20) = 3.17428e-106
f(-19) = 89.6602,       f(-19) = 6.90203e-097
f(-18) = 66.4219,       f(-18) = 5.52095e-088
f(-17) = 49.2066,       f(-17) = 1.62464e-079
f(-16) = 36.4531,       f(-16) = 1.75875e-071
f(-15) = 27.0051,       f(-15) = 7.00418e-064
f(-14) = 20.0059,       f(-14) = 1.02616e-056
f(-13) = 14.8207,       f(-13) = 5.53071e-050
f(-12) = 10.9795,       f(-12) = 1.09661e-043
f(-11) = 8.13379,       f(-11) = 7.99883e-038
f(-10) = 6.02566,       f(-10) = 2.14638e-032
f(-9) = 4.46392,        f(-9) = 2.11882e-027
f(-8) = 3.30695,        f(-8) = 7.6946e-023
f(-7) = 2.44985,        f(-7) = 1.02798e-018
f(-6) = 1.81489,        f(-6) = 5.05227e-015
f(-5) = 1.34451,        f(-5) = 9.13472e-012
f(-4) = 0.996035,       f(-4) = 6.07588e-009
f(-3) = 0.737881,       f(-3) = 1.48672e-006
f(-2) = 0.546636,       f(-2) = 0.00013383
f(-1) = 0.404958,       f(-1) = 0.00443185
f(0) = 0.300000,        f(0) = 0.053991
f(1) = 0.222245,        f(1) = 0.241971
f(2) = 0.164643,        f(2) = 0.398942
f(3) = 0.121971,        f(3) = 0.241971
f(4) = 0.0903583,       f(4) = 0.053991
f(5) = 0.066939,        f(5) = 0.00443185
f(6) = 0.0495897,       f(6) = 0.00013383
f(7) = 0.0367369,       f(7) = 1.48672e-006
f(8) = 0.0272154,       f(8) = 6.07588e-009
f(9) = 0.0201617,       f(9) = 9.13472e-012
f(10) = 0.0149361,      f(10) = 5.05227e-015
f(11) = 0.011065,       f(11) = 1.02798e-018
f(12) = 0.00819712,     f(12) = 7.6946e-023
f(13) = 0.00607257,     f(13) = 2.11882e-027
f(14) = 0.00449867,     f(14) = 2.14638e-032
f(15) = 0.0033327,      f(15) = 7.99883e-038
f(16) = 0.00246892,     f(16) = 1.09661e-043
f(17) = 0.00182902,     f(17) = 5.53071e-050
f(18) = 0.00135497,     f(18) = 1.02616e-056
f(19) = 0.00100379,     f(19) = 7.00418e-064
```

```cpp
#include <iostream>
#include <fstream>
#include <cmath>
#include <vector>
#include <iomanip>
using namespace std;
#define pi 3.14159265
int main() {
    int n = 33;
    vector<double> exp_data(n),normal_data(n);
    double lamda = 0.3;
    double nmean=2.0;
    double nSD=1.0;
    double x = 1/sqrt(2*pi)*nSD ;
    for (int i = -12; i < 17; ++i) {
        double y = exp(-(i-nmean)*(i-nmean)/2*nSD*nSD);
        normal_data[i+12] = x * y;
    }
    for (int i = -12; i < 17; ++i) {
        exp_data[i+12] = lamda*exp(-lamda*i);
    }
    std::ofstream outfile("generated_data.csv");
    outfile << "Exponential          |        Normal\n";
    for (int i = -12; i < 17; ++i) {
        outfile << "f("<<i<< ") = " << exp_data[i+12] << ",      " << "
f("<<i<< ") = " << normal_data[i+12] << "\n";
    }
    outfile.close();
    return 0;
}
```