

Exponential function: Quick and Dirty

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Abstract

The exponential function is a very important function used in multiple fields in physics. This short paper introduces a numerical computation of the exponential function, which uses only multiplication and division. I will be comparing it to the exponential algorithm implemented in C#.

1 Introduction

The "Quick and Dirty" implementation we will be looking at goes as follows.

```
static double ex(double x){  
    if(x<0)return 1/ex(-x);  
    if(x>1.0/8) return Pow(ex(x/2),2);  
    return 1+x*(1+x/2*(1+x/3*(1+x/4*(1+x/5*(1+x/6*(1+x/7*(1+x/8*(1+x/9*(1+x/10))))))))))  
}
```

This implementation writes the exponential function as its Taylor series, including the first 10 elements of the series. If the function receives a negative value, it calls the function as $\exp(-x)^{-1}$. If we supply a value that is lower than some certain precision, in this case 1/8, the function is called recursively as $\exp(x/2)^2$ in order to get the required precision. In figure 1, the comparison between the "Quick and Dirty" implementation and the actual exponential function is shown.

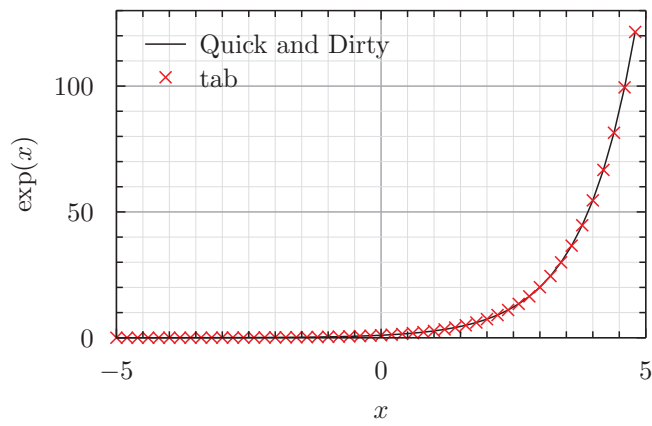


Figure 1: The comparison between the exponential function and the "Quick and Dirty" implementation.