

$$e^x = \frac{x^0}{0!} + \frac{x^1}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \dots + \frac{x^n}{n!}$$

$$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \dots + (-1)^{n-1} \frac{x^{2n-1}}{(2n-1)!}$$

## Pre-lab Part1

```
1. #define EPSILON 10e-9
int fact(int k){
    if (k==0){
        Return 1;
        Return fact((k-1)*k);
    }
}
Int Result = 1
Int N=1
While(( pow(x,n) / fact(n) ) > EPSILON){
    Result+= pow(x,n) / fact(n);
    N+=1;
}
```

```
2. printf("%6.4f\t %10.8f\t%10.8f\t%10.8f\n", x, result, e^x, e^x-x)
```

## Pre-lab Part2

1. getopt() returns the each argument passing into the function
2. enum is a better choice since there are more than 2 options like sin, cos, tan, and exp
3. # define option "s:c:t;e:a:"

```
int main(int argc, char **argv){
    int c = 0;
    enum opt_list { sin=1, cos, tan, exp, all}
    while (c = getopt(argc, argv, option)) != -1){
        switch (c){
            case 's':
                opt = sin;
                break;
            case 'c':
                opt = cos;
                break;
            case 't':
                opt = tan;
                break;
            case 'e':
                opt = exp;
                break;
            case 'a':
                opt = all;
                break;
        }
    }
}
```

```
        opt = cos;  
        break;  
    case 't':  
        opt = tan;  
        break;  
    case 'e':  
        opt = exp;  
        break;  
    case 'a':  
        opt = all;  
        break;  
    }  
    }  
    return 0;  
}
```