

```
def DirectSum(x,n):  
    s=0.  
    for i in range(n):  
        s = s + x  
    return(s)
```

```
def KahanSum(x,n):  
    s=0.  
    c=0.  
    for i in range(n):  
        xp = x - c  
        sp = s  
        s = s + xp  
        c = ((sp + xp) - sp) - xp  
  
    return(s)
```

```
x=0.1  
num=200  
n=(10**np.linspace(1,5,num)).astype(int)  
  
err1=np.zeros(num)  
err2=np.zeros(num)  
for i in range(num):  
    err1[i]=DirectSum(x,n[i])-x*n[i]  
    err2[i]=KahanSum(x,n[i])-x*n[i]
```

```
plt.plot(n,err1,label='Direct')  
plt.plot(n,err2,label='Kahan')  
plt.xscale('log')  
plt.xlabel('n')  
plt.ylabel('error')  
plt.legend()  
plt.show()
```