数值分析报告

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1. 可运行程序

```
function y=myfun(x)
1+ x + x.^2/2 + x.^3/factorial(3) + x.^4/factorial(4) + x.^5/factorial(5) ...
+ x.^6/factorial(6) + x.^7/factorial(7)
end
```

```
abs(myfun(10) - exp(10))

abs(myfun(20) - exp(20))

abs(myfun(-10) - exp(-10))

abs(myfun(-20) - exp(-20))
```

```
function y = lambda1(x,n)
fun1 = 0;
for i = 0:n
    num = 1;
    den = 1;
    for j = 0:n
        if i == j
            continue
        end
        num = num.*(x+1-2j/n);
        den = den*(2*(i-j)/n);
    end
    value = abs(num./den);
    fun1 = fun1 + value;
end
y = fun1;
end
```

```
function y = lambda2(x,n)
 fun1 = 0;
for i = 0:n
    num = 1;
    den = 1;
    for j = 0:n
        if i == j
            continue
        end
        num = num.*(x-cos(j*pi/n));
        den = den*(cos(i*pi/n) - cos(j*pi/n));
    end
    value = abs(num./den);
    fun1 = fun1 + value;
end
y = fun1;
end
```

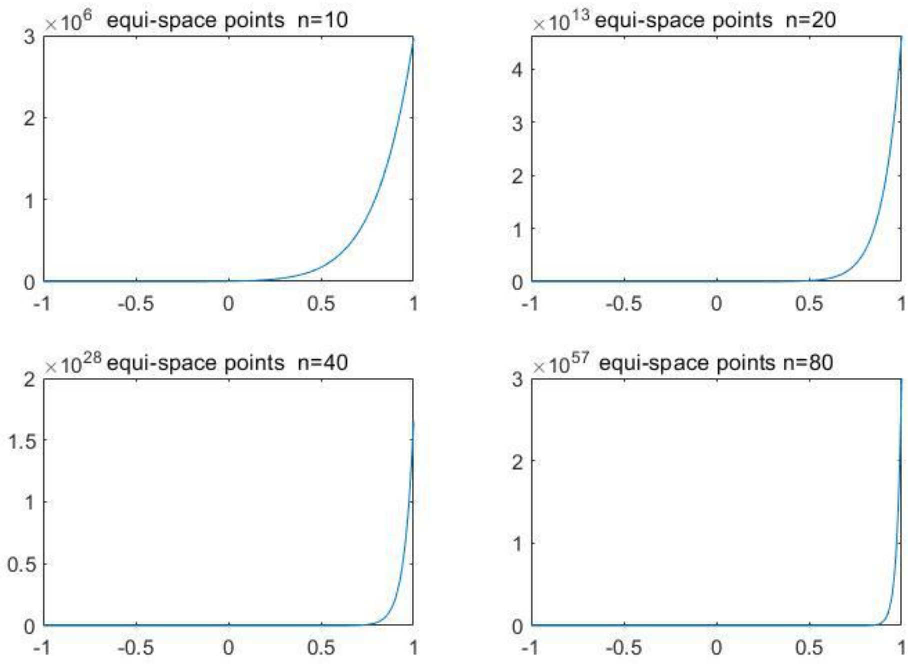
```
function y = dfigure(n)
if n == 1
    x = -1:0.001:1;
    subplot(2,2,1);
    y1 = lambda1(x,10);
    plot(x,y1);
    title('equi-space points  n=10')

    subplot(2,2,2);
    y2 = lambda1(x,20);
    plot(x,y2);
    title('equi-space points  n=20')

    subplot(2,2,3);
    y3 = lambda1(x,40);
    plot(x,y3);
    title('equi-space points  n=40')

    subplot(2,2,4);
    y4 = lambda1(x,80);
```

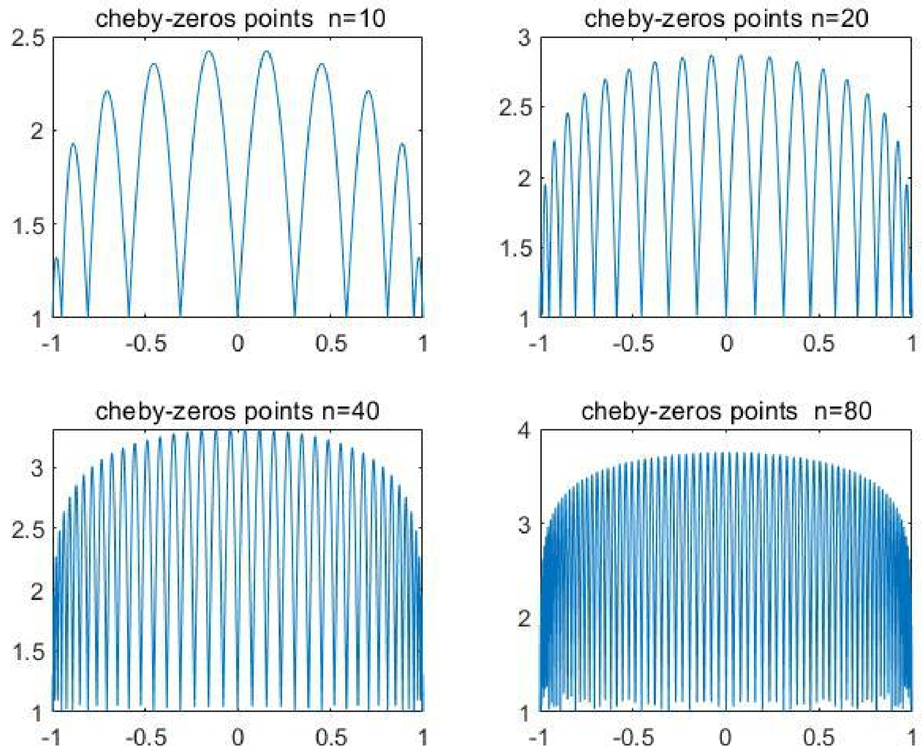
```
    plot(x,y4);
    title('equi-space points n=80')
end
if n == 2
    x = -1:0.001:1;
    subplot(2,2,1);
    y1 = lambda2(x,10);
    plot(x,y1);
    title(' cheby-zeros points  n=10')

    subplot(2,2,2);
    y2 = lambda2(x,20);
    plot(x,y2);
    title('cheby-zeros points n=20')

    subplot(2,2,3);
    y3 = lambda2(x,40);
    plot(x,y3);
    title('cheby-zeros points n=40')

    subplot(2,2,4);
    y4 = lambda2(x,80);
    plot(x,y4);
    title('cheby-zeros points  n=80')
end
end
```

```
dfigure(1)

dfigure(2)
```

2.实验结果

当 x 为 10 时，误差为　1.7176e+04
当 x 为 20 时，误差为　4.8479e+08
当 x 为-10 时，误差为　1.1376e+03
当 x 为-20 时，误差为　1.8623e+05





3. 分析

1．越靠近原点，myfun 计算的结果与 matlab 计算的结果之间的误差越小。

2. 随着插值点的增加，利用等距节点进行高次插值会使插值误差剧烈增加，高次插值多项式近似的效果不好。利用切比雪夫带点进行高次插值则不会出现上述情况。