% Intro: This is the matlab scripts running on Word

% Environment: Word 2013 + Matlab 2015

%Symbolic programming

equ=sym('exp(2)');

class(equ)

equ\_1=vpa(equ,8)

ans =

sym

equ\_1 =

7.3890561

%Writen-style equation

syms a b c;

equ=sqrt(b^2-4\*a\*c);

pretty(equ)

2

sqrt(b - 4 a c)

%因式分解

syms a b c;

f=a^4\*(b^2-c^2)+b^4\*(c^2-a^2)+c^4\*(a^2-b^2);

f1=factor(f)

pretty(f1)

(b - c, b + c, a - c, a + c, a - b, a + b)

f1 =

[ b - c, b + c, a - c, a + c, a - b, a + b]

%表达式通分

syms x y k p;

f=x/(k\*y)+y/(p\*x);

[n,d]=numden(f),

f1=n/d,

n =

p\*x^2 + k\*y^2

d =

k\*p\*x\*y

f1 =

(p\*x^2 + k\*y^2)/(k\*p\*x\*y)

%分解函数为嵌套形式

f=sym('-ax^4+bx^3-cx^2+x-d');

f1=horner(f)

f1 =

- ax^4 + bx^3 - cx^2 - d + x

%解方程，替换子因子

clear;

f=solve('-ax^3+bx^2-cx-d=0');

[r,s]=subexpr(f,'s')

Warning: Do not specify equations and variables as character strings. Instead, create symbolic variables with <a href="matlab:doc('syms')">syms</a>.

> In solve>getEqns (line 445)

In solve (line 225)

r =

bx^2 - cx - ax\*s

s =

ax^2

%复合函数

syms f g t u x y;

f=log(x/t); g=u\*cos(y);

fg=compose(f,g)

fg =

log((u\*cos(y))/t)

%求反函数

syms f g a b x;

f=(a/b)\*sin(x);

g=finverse(f)

g =

asin((b\*x)/a)

%闭环传递函数

n1=[1 3];

d1=conv(conv(conv([1 0],[1 5]), [1 6]),[1 2 2]);

n=28\*n1;

s1=tf(n,d1);

G=feedback(s1,1);

step(G);

n=36\*n1;

s1=tf(n,d1);

G=feedback(s1,1);

step(G);

%极限运算

clear;

syms n;

limit((1+(1/n))^n,n,inf),

ans =

exp(1)





syms f x;

f=((2\*x+3)/(2\*x+1))^(x+1);

limit(f,x,inf)

ans =

exp(1)

syms f x m n;

f=(x^m-1)/(x^n-1);

limit(f,x,1)

ans =

m/n

f=(1-x)\*tan(pi\*x/2);

limit(f,x,1)

ans =

2/pi

syms f x m a;

f=(x^(1/m)-a^(1/m))/(x-a);

limit(f,x,a)

ans =

a^(1/m - 1)/m

f=(sin(x)-sin(a))/(x-a);

limit(f,x,a)

ans =

cos(a)

%极限运算

clear;

syms n;

limit((1+(1/n))^n,n,inf,'left')

ans =

exp(1)

syms x;

limit(((2\*x+3)/(2\*x+1))^(x+1),x,inf,'left')

ans =

exp(1)

syms x;

limit(sin(x)/x,x,0,'right')

limit(sin(x)/x,x,0,'left')

ans =

1

ans =

1

%微分运算 , 偏微分

clear;

syms f x a b;

f=[log(x), a^x; exp(b\*x), tan(x)];

dfdx=diff(f)

df3dx=diff(f,3)

dfdx =

[ 1/x, a^x\*log(a)]

[ b\*exp(b\*x), tan(x)^2 + 1]

df3dx =

[ 2/x^3, a^x\*log(a)^3]

[ b^3\*exp(b\*x), 2\*(tan(x)^2 + 1)^2 + 4\*tan(x)^2\*(tan(x)^2 + 1)]

clear;

syms f x y z;

f=[(x^2)\*sin(2\*y), (x\*exp(y)/(y^2)); x^(y^z), x\*y\*z];

dfdx=collect(diff(f,x))

dfdy=collect(diff(f,y))

dfdz=collect(diff(f,z))

dfdx =

[ (2\*sin(2\*y))\*x, exp(y)/y^2]

[ x^(y^z - 1)\*y^z, y\*z]

dfdy =

[ (2\*cos(2\*y))\*x^2, (exp(y)/y^2 - (2\*exp(y))/y^3)\*x]

[ x^(y^z)\*y^(z - 1)\*z\*log(x), z\*x]

dfdz =

[ 0, 0]

[ x^(y^z)\*y^z\*log(x)\*log(y), y\*x]

%积分运算 ,

clear;

syms f x a b;

f=[log(x), a^x; exp(b\*x), tan(x)];

dfdx=collect(diff(f,x));

intx=int(dfdx)

intx =

[ log(x), a^x]

[ exp(b\*x), tan(x)]

clear;

syms omega f1 f2 a r theata;

f1=(2\*sin(omega))/omega;

f2=r\*exp(-r^2);

int(f1,omega, 0, inf)

int(int(f2,r,0,2\*pi),theata,0, 2\*pi)

ans =

pi

ans =

-pi\*(exp(-4\*pi^2) - 1)

%Taylor 级数展开 ,