Problem 1

已知 x=6,y=5，利用符号表达式求 z 值.

$$z=\frac{x+1}{\sqrt{3+x}-\sqrt{y}}$$

MATLAB Code

```
%% problem 1
syms x y z

z = (x+1)./(sqrt(3+x)-y);

z = subs(z,x,6);
subs(z,y,5)

clearvars x y z

```

Output

```
ans =

-7/2
```

Problem 2

化简表达式

$$(1),\sin\beta_1\cos\beta_2-\cos\beta_1\sin\beta_2 \qquad (2),\frac{4x^2+8x+3}{2x+1}$$

MATLAB Code

```
%% problem 2
% problem 2-1
syms beta1 beta2
f = cos(beta1)*cos(beta2)+sin(beta1)*sin(beta2);
```

```
simplify(f)

clearvars beta1 beta2 f
% problem 2-2
syms x
p = (4*x^2+8*x+3)/(1+2*x);
simplify(p)

clearvars x p

```

Output

```
ans =

cos(beta1 - beta2)


ans =

2*x + 3
```

Problem 3

用符号方法求下列极限或导数：

(1) $\lim\limits_{x\to 0}\dfrac{x(e^{\sin x}+1)-2(e^{\tan x}-1)}{\sin^3 x}$

(2) $\lim\limits_{x\to -1^+}\dfrac{\sqrt{x}-\sqrt{\arccos x}}{\sqrt{x+1}}$

(3) $y=\dfrac{1-\cos(2x)}{x}$，求y',y''

(4)已知 $A=\begin{bmatrix} a^x & t^3 \\ t\cos x & \ln x \end{bmatrix}$ 分别求 $\dfrac{dA}{dx}$、$\dfrac{d^2A}{dt^2}$、$\dfrac{d^2A}{dxdt}$

(5) $f(x,y)=(x^2-2x)\mathrm{e}^{-x^2-y^2-xy}$，求 $\dfrac{\partial \mathrm{f}}{\partial \mathrm{x}}$、$\dfrac{\partial^2 \mathrm{f}}{\partial \mathrm{x}\partial \mathrm{y}}\Big|_{x=0,y=1}$

MATLAB Code

```
%% problem 3
syms x a t

% problem 3-1
f = (x*(exp(sin(x))+1)-2*(exp(tan(x))-1))/(sin(x)^3);
limit(f,x,0)

% problem 3-2
f = (sqrt(x)-sqrt(acos(x)))/(sqrt(1+x));
limit(f,x,1,"right")

% problem 3-3
y = (1-cos(2*x))/(x);
diff(y)
diff(y,2)

% problem 3-4
A = [a^x        t^3;
     t*cos(x)   log(x)];

dAdx = diff(A,x)
d2Adt2 = diff(A,t,2)
dAdxdt = diff(dAdx,t)

Clearvars

```

Output

```
ans =

-1/2


ans =

2^(1/2)/2


ans =
```

```
(2*sin(2*x))/x + (cos(2*x) - 1)/x^2


ans =

(4*cos(2*x))/x - (4*sin(2*x))/x^2 - (2*(cos(2*x) - 1))/x^3


dAdx =

[a^x*log(a),   0]
[ -t*sin(x), 1/x]


d2Adt2 =

[0, 6*t]
[0,   0]


dAdxdt =

[     0, 0]
[-sin(x), 0]
```