Matlab 作业：克拉默法则

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例：按正态分布生成一个 8 阶矩阵 A 和一个 8×1 矩阵 B, 用克拉默法则，解线性方程组 $Ax = B$.

在 Matlab 的命令窗口键入

```
A=randn(8)
B=rand(8,1)
B1=A;
B1(:,1)=B;
B2=A;
B2(:,2)=B;
B3=A;
B3(:,3)=B;
B4=A;
B4(:,4)=B;
B5=A;
B5(:,5)=B;
B6=A;
B6(:,6)=B;
B7=A;
B7(:,7)=B;
B8=A;
B8(:,8)=B;
x_1=det(B1)/det(A)
x_2=det(B2)/det(A)
x_3=det(B3)/det(A)
x_4=det(B4)/det(A)
```

```
x_5=det(B5)/det(A)
x_6=det(B6)/det(A)
x_7=det(B7)/det(A)
x_8=det(B8)/det(A)
```

输出

```
 A =

   0.4282   -0.3775    0.6232    1.0823    0.7812    0.3274    1.4725    0.1286
   0.8956   -0.2959    0.7990   -0.1315    0.5690    0.2341    0.0557    0.6565
   0.7310   -1.4751    0.9409    0.3899   -0.8217    0.0215   -1.2173   -1.1678
   0.5779   -0.2340   -0.9921    0.0880   -0.2656   -1.0039   -0.0412   -0.4606
   0.0403    0.1184    0.2120   -0.6355   -1.1878   -0.9471   -1.1283   -0.2624
   0.6771    0.3148    0.2379   -0.5596   -2.2023   -0.3744   -1.3493   -1.2132
   0.5689    1.4435   -1.0078    0.4437    0.9863   -1.1859   -0.2611   -1.3194
  -0.2556   -0.3510   -0.7420   -0.9499   -0.5186   -1.0559    0.9535    0.9312


 B =

   0.8214
   0.4447
   0.6154
   0.7919
   0.9218
   0.7382
   0.1763
   0.4057


 x_1 =
```

0.5045

x_2 =

0.1657

x_3 =

0.3392

x_4 =

1.2310

x_5 =

-0.6541

x_6 =

-0.9614

x_7 =

-0.1053

```
x_8 =

    0.8161
```

则系数矩阵

$$A = \begin{pmatrix} 0.4282 & -0.3775 & 0.6232 & 1.0823 & 0.7812 & 0.3274 & 1.4725 & 0.1286 \\ 0.8956 & -0.2959 & 0.7990 & -0.1315 & 0.5690 & 0.2341 & 0.0557 & 0.6565 \\ 0.7310 & -1.4751 & 0.9409 & 0.3899 & -0.8217 & 0.0215 & -1.2173 & -1.1678 \\ 0.5779 & -0.2340 & -0.9921 & 0.0880 & -0.2656 & -1.0039 & -0.0412 & -0.4606 \\ 0.0403 & 0.1184 & 0.2120 & -0.6355 & -1.1878 & -0.9471 & -1.1283 & -0.2624 \\ 0.6771 & 0.3148 & 0.2379 & -0.5596 & -2.2023 & -0.3744 & -1.3493 & -1.2132 \\ 0.5689 & 1.4435 & -1.0078 & 0.4437 & 0.9863 & -1.1859 & -0.2611 & -1.3194 \\ -0.2556 & -0.3510 & -0.7420 & -0.9499 & -0.5186 & -1.0559 & 0.9535 & 0.9312 \end{pmatrix},$$

常数项为

$$B = \begin{pmatrix} 0.8214 \\ 0.4447 \\ 0.6154 \\ 0.7919 \\ 0.9218 \\ 0.7382 \\ 0.1763 \\ 0.4057 \end{pmatrix}$$

解为

$$x = \begin{pmatrix} 0.5045 \\ 0.1657 \\ 0.3392 \\ 1.2310 \\ -0.6541 \\ -0.9614 \\ -0.1053 \\ 0.8161 \end{pmatrix}$$

另一方法：

在 Matlab 编辑器内编辑下列程序：

```
n=8;
A=randn(n)
B=randn(n,1)
x=zeros(n,1);
for j=1:n
    B1=A;
    B1(:,j)=B;
    x(j,1)=det(B1)/det(A);
end
x
```

并在工具栏点击 run, 则在命令窗口输出

 A =

   -1.6041   -2.1707   0.3803   0.4282   -0.3775   0.6232   1.0823   0.7812
    0.2573   -0.0592   -1.0091   0.8956   -0.2959   0.7990   -0.1315   0.5690
   -1.0565   -1.0106   -0.0195   0.7310   -1.4751   0.9409   0.3899   -0.8217
    1.4151   0.6145   -0.0482   0.5779   -0.2340   -0.9921   0.0880   -0.2656
   -0.8051   0.5077   0.0000   0.0403   0.1184   0.2120   -0.6355   -1.1878
    0.5287   1.6924   -0.3179   0.6771   0.3148   0.2379   -0.5596   -2.2023
    0.2193   0.5913   1.0950   0.5689   1.4435   -1.0078   0.4437   0.9863
   -0.9219   -0.6436   -1.8740   -0.2556   -0.3510   -0.7420   -0.9499   -0.5186

 B =

    0.3274
    0.2341
    0.0215
   -1.0039
   -0.9471
   -0.3744

```
      -1.1859

      -1.0559


x =

      -0.3908
       1.3800
      -1.2729
      -1.4582
      -0.2513
       0.7789
       2.8347
       0.2000
```

则系数矩阵为

$$A = \begin{pmatrix} -1.6041 & -2.1707 & 0.3803 & 0.4282 & -0.3775 & 0.6232 & 1.0823 & 0.7812 \\ 0.2573 & -0.0592 & -1.0091 & 0.8956 & -0.2959 & 0.7990 & -0.1315 & 0.5690 \\ -1.0565 & -1.0106 & -0.0195 & 0.7310 & -1.4751 & 0.9409 & 0.3899 & -0.8217 \\ 1.4151 & 0.6145 & -0.0482 & 0.5779 & -0.2340 & -0.9921 & 0.0880 & -0.2656 \\ -0.8051 & 0.5077 & 0.0000 & 0.0403 & 0.1184 & 0.2120 & -0.6355 & -1.1878 \\ 0.5287 & 1.6924 & -0.3179 & 0.6771 & 0.3148 & 0.2379 & -0.5596 & -2.2023 \\ 0.2193 & 0.5913 & 1.0950 & 0.5689 & 1.4435 & -1.0078 & 0.4437 & 0.9863 \\ -0.9219 & -0.6436 & -1.8740 & -0.2556 & -0.3510 & -0.7420 & -0.9499 & -0.5186 \end{pmatrix}$$

常数项为

$$B = \begin{pmatrix} 0.3274 \\ 0.2341 \\ 0.0215 \\ -1.0039 \\ -0.9471 \\ -0.3744 \\ -1.1859 \\ -1.0559 \end{pmatrix}$$

解为

$$x = \begin{pmatrix} -0.3908 \\ 1.3800 \\ -1.2729 \\ -1.4582 \\ -0.2513 \\ 0.7789 \\ 2.8347 \\ 0.2000 \end{pmatrix}$$

补充作业：按均匀分布生成一个 7 阶矩阵 A 和一个 7×1 矩阵 B, 用克拉默法则，解线性方程组 $Ax = B$.