

So luong he truc toa do: 9

n =

9

He truc so Chuyen vi cua he truc, 0/1 (0:Tinh tien, 1:Quay)0

C =

Columns 1 through 10

0 1 0 1 0 1 0 1 0 1

Column 11

0

Dich chuyen theo truc x : 0

dx =

0

Dich chuyen theo truc y : 0

dy =

0

Dich chuyen theo truc z : 11

dz =

11

T =

[1, 0, 0, 0]

[0, 1, 0, 0]

[0, 0, 1, 11]

[0, 0, 0, 1]

He truc so Chuyen vi cua he truc, 0/1 (0:Tinh tien, 1:Quay)1

C =

Columns 1 through 10

0 1 0 1 0 1 0 1 0 1

Column 11

0

Quay quanh trục nào x/y/z: z

Q =

z

Gia trị quay quanh trục: t1

t =

t1

T =

```
[ cos(t1), -sin(t1), 0, 0]
[ sin(t1),  cos(t1), 0, 0]
[      0,      0, 1, 1]
[      0,      0, 0, 1]
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Hệ trục số Chuyển vị của hệ trục, 0/1 (0:Tĩnh tiến, 1:Quay)0

C =

Columns 1 through 10

0 1 0 1 0 1 0 1 0 1

Column 11

0

Địch chuyển theo trục x : 0

dx =

0

Địch chuyển theo trục y : 0

dy =

0

Dich chuyen theo truc z : l2

dz =

l2

T =

```
[ cos(t1), -sin(t1), 0,      0]
[ sin(t1),  cos(t1), 0,      0]
[      0,      0, 1, l1 + l2]
[      0,      0, 0,      1]
```

He truc so Chuyen vi cua he truc, 0/1 (0:Tinh tien, 1:Quay)1

C =

Columns 1 through 10

0 1 0 1 0 1 0 1 0 1

Column 11

0

Quay quanh tuc nao x/y/z: x

Q =

x

Gia tri quay quanh truc: t2

t =

t2

T =

```
[ cos(t1), -cos(t2)*sin(t1), sin(t1)*sin(t2),      0]
[ sin(t1),  cos(t1)*cos(t2), -cos(t1)*sin(t2),      0]
[      0,      sin(t2),      cos(t2), l1 + l2]
[      0,      0,      0,      1]
```

He truc so Chuyen vi cua he truc, 0/1 (0:Tinh tien, 1:Quay)0

C =

Columns 1 through 10

0 1 0 1 0 1 0 1 0 1

Column 11

0

Dich chuyen theo truc x : 0

dx =

0

Dich chuyen theo truc y : 13

dy =

13

Dich chuyen theo truc z : 0

dz =

0

T =

```
[ cos(t1), -cos(t2)*sin(t1), sin(t1)*sin(t2), -13*cos(t2)*sin(t1)]
[ sin(t1), cos(t1)*cos(t2), -cos(t1)*sin(t2), 13*cos(t1)*cos(t2)]
[ 0, sin(t2), cos(t2), 11 + 12 + 13*sin(t2)]
[ 0, 0, 0, 1]
```

He truc so Chuyen vi cua he truc, 0/1 (0:Tinh tien, 1:Quay)1

C =

Columns 1 through 10

0 1 0 1 0 1 0 1 0 1

Column 11

0

Quay quanh trục nào x/y/z: x

Q =

x

Gia trị quay quanh trục: t3

t =

t3

T =

```
[ cos(t1), sin(t1)*sin(t2)*sin(t3) - cos(t2)*cos(t3)*sin(t1), cos(t2)*sin(t1)*sin(t3) + cos(t3)*sin(t1)*sin(t2), -l3*cos(t2)*sin(t1)]
[ sin(t1), cos(t1)*cos(t2)*cos(t3) - cos(t1)*sin(t2)*sin(t3), - cos(t1)*cos(t2)*sin(t3) - cos(t1)*cos(t3)*sin(t2), l3*cos(t1)*cos(t2)]
[ 0, cos(t2)*sin(t3) + cos(t3)*sin(t2), cos(t2)*cos(t3) - sin(t2)*sin(t3), l1 + l2 + l3*sin(t2)]
[ 0, 0, 0, 1]
```

Hệ trục số Chuyển vị của hệ trục, 0/1 (0:Tĩnh tiến, 1:Quay)0

C =

Columns 1 through 10

0 1 0 1 0 1 0 1 0 1

Column 11

0

Dịch chuyển theo trục x : 0

dx =

0

Dịch chuyển theo trục y : 14

dy =

14

Dịch chuyển theo trục z : 0

0

$$\begin{aligned} & [\cos(t_1), \sin(t_1)\sin(t_2)\sin(t_3) - \cos(t_2)\cos(t_3)\sin(t_1), \cos(t_2)\sin(t_1)\sin(t_3) \\ & + \cos(t_3)\sin(t_1)\sin(t_2), 14(\sin(t_1)\sin(t_2)\sin(t_3) - \cos(t_2)\cos(t_3)\sin(t_1)) - 13\cos(t_2)\sin(t_1)] \\ & [\sin(t_1), \cos(t_1)\cos(t_2)\cos(t_3) - \cos(t_1)\sin(t_2)\sin(t_3), -\cos(t_1)\cos(t_2)\sin(t_3) \\ & - \cos(t_1)\cos(t_3)\sin(t_2), 13\cos(t_1)\cos(t_2) - 14(\cos(t_1)\sin(t_2)\sin(t_3) - \cos(t_1)\cos(t_2)\cos(t_3))] \\ & [0, \cos(t_2)\sin(t_3) + \cos(t_3)\sin(t_2), \cos(t_2)\cos(t_3) - \sin(t_2)\sin(t_3), 11 + 12 + 14(\cos(t_2)\sin(t_3) + \cos(t_3)\sin(t_2)) + 13\sin(t_2)] \\ & [0, 0, 0, 1] \end{aligned}$$

C =

0 1 0 1 0 1 0 1 0 1

0

$$Q =$$

X

$$t =$$

t4

$$T =$$
$$[\cos(t_1), \cos(t_4) * (\sin(t_1) * \sin(t_2) * \sin(t_3) - \cos(t_2) * \cos(t_3) * \sin(t_1)) + \sin(t_4) * (\cos(t_2) * \sin(t_1) * \sin(t_3) + \cos(t_3) * \sin(t_1) * \sin(t_2)), \cos(t_4) * (\cos(t_2) * \sin(t_1) * \sin(t_3) - \cos(t_3) * \sin(t_1) * \sin(t_2)) + \sin(t_4) * (\cos(t_2) * \cos(t_3) * \sin(t_1) - \cos(t_3) * \cos(t_2) * \sin(t_1))]$$

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+ cos(t3)*sin(t1)*sin(t2)) - sin(t4)*(sin(t1)*sin(t2)*sin(t3) - cos(t2)*cos(t3)*sin(t1)), 14*(sin(t1)*sin(t2)*sin(t3) - cos(t2)*cos(t3)*sin(t1)) - 13*cos(t2)*sin(t1)]
[ sin(t1), - cos(t4)*(cos(t1)*sin(t2)*sin(t3) - cos(t1)*cos(t2)*cos(t3)) - sin(t4)*
(cos(t1)*cos(t2)*sin(t3) + cos(t1)*cos(t3)*sin(t2)), sin(t4)*(cos(t1)*sin(t2)*sin(t3)
- cos(t1)*cos(t2)*cos(t3)) - cos(t4)*(cos(t1)*cos(t2)*sin(t3) + cos(t1)*cos(t3)*sin
(t2)), 13*cos(t1)*cos(t2) - 14*(cos(t1)*sin(t2)*sin(t3) - cos(t1)*cos(t2)*cos(t3))]
[      0,      cos(t4)*(cos(t2)*sin(t3) + cos(t3)*sin(t2)) + sin(t4)*(cos(t2)*cos(t3) - sin(t2)*sin(t3)),
cos(t4)*(cos(t2)*cos(t3) - sin(t2)*sin(t3)) - sin(t4)*(cos(t2)*sin(t3) + cos(t3)*sin
(t2)),      11 + 12 + 14*(cos(t2)*sin(t3) + cos(t3)*sin(t2)) + 13*sin(t2)]
[      0,
0,
0,
0,
1]

```

He truc so Chuyen vi cua he truc, 0/1 (0:Tinh tien, 1:Quay)0

C =

Columns 1 through 10

```

0      1      0      1      0      1      0      1      0      1

```

Column 11

```

0

```

Dich chuyen theo truc x : 0

dx =

```

0

```

Dich chuyen theo truc y : 15

dy =

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15

```

Dich chuyen theo truc z : 16

dz =

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16

```

T =

```

[ cos(t1), cos(t4)*(sin(t1)*sin(t2)*sin(t3) - cos(t2)*cos(t3)*sin(t1)) + sin(t4)*
(cos(t2)*sin(t1)*sin(t3) + cos(t3)*sin(t1)*sin(t2)), cos(t4)*(cos(t2)*sin(t1)*sin(t3)

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+ cos(t3)*sin(t1)*sin(t2)) - sin(t4)*(sin(t1)*sin(t2)*sin(t3) - cos(t2)*cos(t3)*sin(t1)),
l4*(sin(t1)*sin(t2)*sin(t3) - cos(t2)*cos(t3)*sin(t1)) + l5*(cos(t4)*(sin(t1)*sin(t2)*sin(t3) - cos(t2)*cos(t3)*sin(t1)) + sin(t4)*(cos(t2)*sin(t1)*sin(t3) + cos(t3)*sin(t1)*sin(t2))) + l6*(cos(t4)*(cos(t2)*sin(t1)*sin(t3) + cos(t3)*sin(t1)*sin(t2)) - sin(t4)*(sin(t1)*sin(t2)*sin(t3) - cos(t2)*cos(t3)*sin(t1))) - l3*cos(t2)*sin(t1)]
[ sin(t1), -cos(t4)*(cos(t1)*sin(t2)*sin(t3) - cos(t1)*cos(t2)*cos(t3)) - sin(t4)*(cos(t1)*cos(t2)*sin(t3) + cos(t1)*cos(t3)*sin(t2)), sin(t4)*(cos(t1)*sin(t2)*sin(t3) - cos(t1)*cos(t2)*cos(t3)) - cos(t4)*(cos(t1)*cos(t2)*sin(t3) + cos(t1)*cos(t3)*sin(t2)), l3*cos(t1)*cos(t2) - l5*(cos(t4)*(cos(t1)*sin(t2)*sin(t3) - cos(t1)*cos(t2)*cos(t3)) + sin(t4)*(cos(t1)*cos(t2)*sin(t3) + cos(t1)*cos(t3)*sin(t2))) - l6*(cos(t4)*(cos(t1)*cos(t2)*sin(t3) + cos(t1)*cos(t3)*sin(t2)) - sin(t4)*(cos(t1)*sin(t2)*sin(t3) - cos(t1)*cos(t2)*cos(t3))) - l4*(cos(t1)*sin(t2)*sin(t3) - cos(t1)*cos(t2)*cos(t3))]
[ 0, cos(t4)*(cos(t2)*sin(t3) + cos(t3)*sin(t2)) + sin(t4)*(cos(t2)*cos(t3) - sin(t2)*sin(t3))
cos(t4)*(cos(t2)*cos(t3) - sin(t2)*sin(t3)) - sin(t4)*(cos(t2)*sin(t3) + cos(t3)*sin(t2)),
l1 + l2 + l4*(cos(t2)*sin(t3) + cos(t3)*sin(t2)) + l3*sin(t2) + l5*(cos(t4)*(cos(t2)*sin(t3) + cos(t3)*sin(t2)) + sin(t4)*(cos(t2)*cos(t3) - sin(t2)*sin(t3))) + l6*(cos(t4)*(cos(t2)*cos(t3) - sin(t2)*sin(t3)) - sin(t4)*(cos(t2)*sin(t3) + cos(t3)*sin(t2)))]
[ 0,
0,
0,
1]

```

ans =

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[ cos(t1), -cos(t2 + t3 + t4)*sin(t1), sin(t2 + t3 + t4)*sin(t1), -sin(t1)*(l4*cos(t2 + t3) + l3*cos(t2) + l5*cos(t2 + t3 + t4) - l6*sin(t2 + t3 + t4))]
[ sin(t1), cos(t2 + t3 + t4)*cos(t1), -sin(t2 + t3 + t4)*cos(t1), cos(t1)*(l4*cos(t2 + t3) + l3*cos(t2) + l5*cos(t2 + t3 + t4) - l6*sin(t2 + t3 + t4))]
[ 0, sin(t2 + t3 + t4), cos(t2 + t3 + t4), l1 + l2 + l4*sin(t2 + t3) + l3*sin(t2) + l6*cos(t2 + t3 + t4) + l5*sin(t2 + t3 + t4)]
[ 0, 0, 0]
1]

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