

Test de la table de la loi du groupe symétrique S3

Création du groupe symétrique S3 et de sa table

```
S3:=Dom::SymmetricGroup(3);
les_sigma:=S3::allElements();
ord:=S3::size();
Noms:=["e","t1","t2","t3","c","c^2"];
indice_de_mes_sigma:=[5, 3, 2, 6, 1, 4];
mes_sigma:=[les_sigma[indice_de_mes_sigma[k]] $k=1..ord];

Dom::SymmetricGroup(3)

[[2, 3, 1], [3, 2, 1], [1, 3, 2], [3, 1, 2], [1, 2, 3], [2, 1, 3]]

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["e", "t1", "t2", "t3", "c", "c^2"]

[5, 3, 2, 6, 1, 4]

[[1, 2, 3], [1, 3, 2], [3, 2, 1], [2, 1, 3], [2, 3, 1], [3, 1, 2]]
```

Calcul de la table de la loi (dans l'ordre que j'ai choisi !)

```
table_de_S3:= array(1..ord,1..ord,
[ [ S3::_mult( mes_sigma[i],
               mes_sigma[j])
  $j=1..ord] $i=1..ord]);
t:= array(1..ord,1..ord,
[ [ contains(mes_sigma,table_de_S3[i,j])
  $j=1..ord] $i=1..ord]);

(
[1, 2, 3] [1, 3, 2] [3, 2, 1] [2, 1, 3] [2, 3, 1] [3, 1, 2]
[1, 3, 2] [1, 2, 3] [2, 3, 1] [3, 1, 2] [3, 2, 1] [2, 1, 3]
[3, 2, 1] [3, 1, 2] [1, 2, 3] [2, 3, 1] [2, 1, 3] [1, 3, 2]
[2, 1, 3] [2, 3, 1] [3, 1, 2] [1, 2, 3] [1, 3, 2] [3, 2, 1]
[2, 3, 1] [2, 1, 3] [1, 3, 2] [3, 2, 1] [3, 1, 2] [1, 2, 3]
[3, 1, 2] [3, 2, 1] [2, 1, 3] [1, 3, 2] [1, 2, 3] [2, 3, 1]
)

(
1 2 3 4 5 6
2 1 5 6 3 4
3 6 1 5 4 2
4 5 6 1 2 3
5 4 2 3 6 1
6 3 4 2 1 5
)
```

Test et recherche de l'élément neutre

```
is_neutre:=i->_and(iszero(t[i,j]-j) $j=1..ord , iszero(t[j,i]-j) $j=1..ord):
is_neutre(k) $ k=1..ord;
ineutre:=select(k $ k=1..ord,is_neutre);
text2expr(Noms[ineutre])=mes_sigma[ineutre];

TRUE, FALSE, FALSE, FALSE, FALSE, FALSE

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e = [1, 2, 3]
```

Test et établissement de la table des symétriques

```
ineutre;  
is_sym:=(i,j)->_and(iszero(t[i,j]-ineutre) , iszero(t[j,i]-ineutre) );  
is_sym(2,2);  
symetriques:=[select(k $ k=1..ord,is_sym,i) $ i=1..ord];  
map(symetriques,x->text2expr(Noms[x]));
```

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$(i, j) \rightarrow \text{iszero}(t_{i,j} - \text{ineutre}) \wedge \text{iszero}(t_{j,i} - \text{ineutre})$

TRUE

[1, 2, 3, 4, 6, 5]

[e, t1, t2, t3, c^2 , c]

Test de l'associativité

```
ord^3;  
is_assoc:=_and( iszero(t[t[i,j],k]-t[i,t[j,k]]) $i=1..ord $j=1..ord $k=1..ord );
```

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TRUE