```
F[x_, y_, z_] := Det[{{f[x], g[x], h[x]}, {f[y], g[y], h[y]}, {f[z], g[z], h[z]}}]
```

```
F[x, y, z] * F[u, v, z] - F[x, u, z] * F[y, v, z] + F[x, v, z] * F[y, u, z] // Simplify
```

```
0
```

```
Sum[
 G[x[1], x[2], x[3]] G[x[4], x[5], x[6]] /. Thread[Array[x, 6] → p],
 {p, Permutations[Array[x, 6]]}
]
```

A very large output was generated. Here is a sample of it:

```
2 G[x[1], x[5], x[6]] G[x[2], x[3], x[4]] +
 2 G[x[1], x[6], x[5]] G[x[2], x[3], x[4]] +
 2 G[x[1], x[4], x[6]] G[x[2], x[3], x[5]] +
 2 G[x[1], x[6], x[4]] G[x[2], x[3], x[5]] +
 <<352>> + 2 G[x[2], x[1], x[3]] G[x[6], x[5], x[4]] +
 2 G[x[2], x[3], x[1]] G[x[6], x[5], x[4]] +
 2 G[x[3], x[1], x[2]] G[x[6], x[5], x[4]] +
 2 G[x[3], x[2], x[1]] G[x[6], x[5], x[4]]
```

Show Less | Show More | Show Full Output | Set Size Limit...

```
Factor[
 Sum[
  F[x[1], x[2], x[3]] F[x[4], x[5], x[6]] /. Thread[Array[x, 6] → p],
  {p, Permutations[Array[x, 6]]}
 ]
]
```

```
0
```

```
Factor[
 Sum[
  F[x[1], x[2], x[3]] Signature[p] /. Thread[Array[x, 3] → p],
  {p, Permutations[Array[x, 3]]}
 ]
]
```

```
-6 (f[x[3]] g[x[2]] h[x[1]] - f[x[2]] g[x[3]] h[x[1]] - f[x[3]] g[x[1]] h[x[2]] +
    f[x[1]] g[x[3]] h[x[2]] + f[x[2]] g[x[1]] h[x[3]] - f[x[1]] g[x[2]] h[x[3]])
```

```
Factor[
 Sum[
  F[x[1], x[2], x[3]] F[x[4], x[5], x[6]] /. Thread[Array[x, 6] → p],
  {p, Permutations[Array[x, 6]]}
 ]
]
```

```
0
```

```
Factor[
 Sum[
  Times[
   F[x[1], x[2], x[3]] F[x[4], x[5], x[6]] /. Thread[Array[x, 6] → p],
   Signature[Take[p, 3]] Signature[Take[p, -3]]
  ],
  {p, Permutations[Array[x, 6]]}
 ]
]
```

```
-288 (-f[x[5]] g[x[3]] h[x[1]] + f[x[3]] g[x[5]] h[x[1]] + f[x[5]] g[x[1]] h[x[3]] -
    f[x[1]] g[x[5]] h[x[3]] - f[x[3]] g[x[1]] h[x[5]] + f[x[1]] g[x[3]] h[x[5]])
 (f[x[6]] g[x[4]] h[x[2]] - f[x[4]] g[x[6]] h[x[2]] - f[x[6]] g[x[2]] h[x[4]] +
    f[x[2]] g[x[6]] h[x[4]] + f[x[4]] g[x[2]] h[x[6]] - f[x[2]] g[x[4]] h[x[6]])
```