```
f[p_, q_] := (c[p - 1] - c[q - 1]) / (p - q)
```

```
f[1, 2] * f[1, 3] * f[1, 4] * f[2, 3] * f[2, 4] * f[3, 4]
```

$$\frac{1}{12} (-c[0] + c[1]) (-c[0] + c[2]) (-c[1] + c[2]) (-c[0] + c[3]) (-c[1] + c[3]) (-c[2] + c[3])$$

```
FortranForm[%]
```

```
((-c(0) + c(1))*(-c(0) + c(2))*(-c(1) + c(2))*(-c(0) + c(3))*(-c(1) + c(3))*(-c(2) + c(3))
```

```
G = SparseArray[{
   {1, 1, 1} → 1, {1, 2, 2} → 1, {1, 3, 3} → -1, {1, 4, 4} → -1,
   {2, 4, 1} → -1, {2, 3, 2} → -1, {2, 2, 3} → 1, {2, 1, 4} → 1,
   {3, 4, 1} → -I, {3, 3, 2} → I, {3, 2, 3} → I, {3, 1, 4} → -I, {4, 3, 1} → -1,
   {4, 4, 2} → 1, {4, 2, 4} → -1, {4, 1, 3} → 1}]; G[[4]] // MatrixForm
G5 = I * G[[1]].G[[2]].G[[3]].G[[4]]; G5 // MatrixForm
```

$$\begin{pmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & -1 \\ -1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{pmatrix}$$

$$\begin{pmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{pmatrix}$$

```
a = 3
```

```
3
```

```
a = 1; b = 1; MatrixForm[Normal[Simplify[G[[b]].G[[a]].G5 - G[[a]].G5.G[[b]]]]]
```

$$\begin{pmatrix} 0 & 0 & 2 & 0 \\ 0 & 0 & 0 & 2 \\ 2 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 \end{pmatrix}$$

```
Sigma5[a_, b_] := I / 2 * (G[[a]].G[[b]] - G[[b]].G[[a]]).G5
```

```
Sigma5[3, 4] // MatrixForm
```

$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & -1 \end{pmatrix}$$

```
Sigma[a_, b_] := I / 2 * (G[[a]].G[[b]] - G[[b]].G[[a]])
```

```
Sigma2[a_, b_] := -1 / 2 Sum[Sigma5[c, d] * Signature[{a, b, c, d}], {c, 1, 4}, {d, 1, 4}]
```

```
Sigma[4, 3] - Sigma2[4, 3]
```

```
{{0, 0, 0, 0}, {0, 0, 0, 0}, {0, 0, 0, 0}, {0, 0, 0, 0}}
```

```
-1
```

```
L = {32, 16, 16, 16}; G = {1, -1, -1, -1};
```

```
mu[a_] := Sum[(a[[i]] * 2 * Pi / L[[i]]) ^ 2, {i, 4}]
```

```
N[mu[{7 + 1 / 2, 3, 4, 4}], 20]
```

```
8.4913295677341063898
```

```
r
```

```
0.17512765 / 0.31131822
```

```
0.562536
```

```
1 + 16 + 3 + 16 + 3 + 3 + 16 * 4 + 2
```

```
108
```

```
N[2 / (1 / 0.10414239 + 1 / 0.10402374), 10]
```

```
0.104083
```

```
1 + 16 + 3 + 16 + 3 + 3 + 16 * 4 + 2 + 5
```

```
113
```