```
Log[I]
```

$$\frac{i \pi}{2}$$

```
Log[3 I]
```

$$\frac{i \pi}{2} + \text{Log}[3]$$

```
Table[ Mod[n, 4 I] - Mod[n - 1, 4 I], {n, 1, 10}]
```

$$\{1, 1, -3, 1, 1, -3, 1, 1, 1, 1\}$$

```
PolyGamma[1, 1 / 2]
```

$$\frac{\pi^2}{2}$$

```
N[PolyGamma[1, 1 / 3]]
```

$$10.0956$$

```
t[n_, a_] := Mod[n, a] - Mod[n - 1, a]
```

```
Sum[ t[k, 2] / k^2, {k, 1, Infinity}]
```

$$\frac{\pi^2}{12}$$

```
Sum[ t[k, 3] / k^2, {k, 1, Infinity}]
```

$$\frac{1}{27} \left( -\pi^2 + 3 \, \text{PolyGamma}\left[1, \frac{1}{3}\right] + 3 \, \text{PolyGamma}\left[1, \frac{2}{3}\right] \right)$$

```
Sum[ t[k, 4] / k^2, {k, 1, Infinity}]
```

$$\frac{1}{16} \left( \text{PolyGamma}\left[1, \frac{1}{4}\right] + \text{PolyGamma}\left[1, \frac{3}{4}\right] \right)$$

```
Sum[ t[k, 5] / k^2, {k, 1, Infinity}]
```

$$\frac{1}{75} \left( -2 \, \pi^2 + 3 \, \text{PolyGamma}\left[1, \frac{1}{5}\right] + 3 \, \text{PolyGamma}\left[1, \frac{2}{5}\right] + 3 \, \text{PolyGamma}\left[1, \frac{3}{5}\right] + 3 \, \text{PolyGamma}\left[1, \frac{4}{5}\right] \right)$$

```
Sum[ t[k, 6] / k^2, {k, 1, Infinity}]
```

$$\frac{1}{108} \left( -\pi^2 + 3 \, \text{PolyGamma}\left[1, \frac{1}{6}\right] + 3 \, \text{PolyGamma}\left[1, \frac{1}{3}\right] + 3 \, \text{PolyGamma}\left[1, \frac{2}{3}\right] + 3 \, \text{PolyGamma}\left[1, \frac{5}{6}\right] \right)$$

```
Sum[ t[k, 7] / k^2, {k, 1, Infinity}]
```

$$\frac{1}{49} \left( -\pi^2 + \text{PolyGamma}\left[1, \frac{1}{7}\right] + \text{PolyGamma}\left[1, \frac{2}{7}\right] + \text{PolyGamma}\left[1, \frac{3}{7}\right] + \text{PolyGamma}\left[1, \frac{4}{7}\right] + \text{PolyGamma}\left[1, \frac{5}{7}\right] + \text{PolyGamma}\left[1, \frac{6}{7}\right] \right)$$

```
Sum[ t[k, 8] / k^2, {k, 1, Infinity}]
```

$$\frac{1}{192} \left( -2 \, \pi^2 + 3 \, \text{PolyGamma}\left[1, \frac{1}{8}\right] + 3 \, \text{PolyGamma}\left[1, \frac{1}{4}\right] + 3 \, \text{PolyGamma}\left[1, \frac{3}{8}\right] + 3 \, \text{PolyGamma}\left[1, \frac{5}{8}\right] + 3 \, \text{PolyGamma}\left[1, \frac{3}{4}\right] + 3 \, \text{PolyGamma}\left[1, \frac{7}{8}\right] \right)$$

```
Sum[ t[k, 9] / k^2, {k, 1, Infinity}]
```

$$\frac{1}{243}\left(-4\,\pi^2+3\,\text{PolyGamma}\left[1,\frac{1}{9}\right]+3\,\text{PolyGamma}\left[1,\frac{2}{9}\right]+3\,\text{PolyGamma}\left[1,\frac{1}{3}\right]+3\,\text{PolyGamma}\left[1,\frac{4}{9}\right]+3\,\text{PolyGamma}\left[1,\frac{5}{9}\right]+3\,\text{PolyGamma}\left[1,\frac{2}{3}\right]+3\,\text{PolyGamma}\left[1,\frac{7}{9}\right]+3\,\text{PolyGamma}\left[1,\frac{8}{9}\right]\right)$$

```
Sum[ t[k, 10] / k^2, {k, 1, Infinity}]
```

$$\frac{1}{100}\left(-\pi^2+\text{PolyGamma}\left[1,\frac{1}{10}\right]+\text{PolyGamma}\left[1,\frac{1}{5}\right]+\text{PolyGamma}\left[1,\frac{3}{10}\right]+\text{PolyGamma}\left[1,\frac{2}{5}\right]+\text{PolyGamma}\left[1,\frac{3}{5}\right]+\text{PolyGamma}\left[1,\frac{7}{10}\right]+\text{PolyGamma}\left[1,\frac{4}{5}\right]+\text{PolyGamma}\left[1,\frac{9}{10}\right]\right)$$

```
Sum[ t[k, 11] / k^2, {k, 1, Infinity}]
```

$$\frac{1}{363}\left(-5\,\pi^2+3\,\text{PolyGamma}\left[1,\frac{1}{11}\right]+3\,\text{PolyGamma}\left[1,\frac{2}{11}\right]+3\,\text{PolyGamma}\left[1,\frac{3}{11}\right]+3\,\text{PolyGamma}\left[1,\frac{4}{11}\right]+3\,\text{PolyGamma}\left[1,\frac{5}{11}\right]+3\,\text{PolyGamma}\left[1,\frac{6}{11}\right]+3\,\text{PolyGamma}\left[1,\frac{7}{11}\right]+3\,\text{PolyGamma}\left[1,\frac{8}{11}\right]+3\,\text{PolyGamma}\left[1,\frac{9}{11}\right]+3\,\text{PolyGamma}\left[1,\frac{10}{11}\right]\right)$$

```
Sum[ t[k, 12] / k^2, {k, 1, Infinity}]
```

$$\frac{1}{432}\left(-4\,\pi^2+3\,\text{PolyGamma}\left[1,\frac{1}{12}\right]+3\,\text{PolyGamma}\left[1,\frac{1}{6}\right]+3\,\text{PolyGamma}\left[1,\frac{1}{4}\right]+3\,\text{PolyGamma}\left[1,\frac{1}{3}\right]+3\,\text{PolyGamma}\left[1,\frac{5}{12}\right]+3\,\text{PolyGamma}\left[1,\frac{7}{12}\right]+3\,\text{PolyGamma}\left[1,\frac{2}{3}\right]+3\,\text{PolyGamma}\left[1,\frac{3}{4}\right]+3\,\text{PolyGamma}\left[1,\frac{5}{6}\right]+3\,\text{PolyGamma}\left[1,\frac{11}{12}\right]\right)$$

```
Sum[ t[k, 2] / k^3, {k, 1, Infinity}]
```

$$\frac{1}{16}\left(\text{PolyGamma}[2,1]+14\,\text{Zeta}[3]\right)$$

```
Sum[ t[k, 3] / k^3, {k, 1, Infinity}]
```

$$\frac{1}{54}\left(-\text{PolyGamma}\left[2,\frac{1}{3}\right]-\text{PolyGamma}\left[2,\frac{2}{3}\right]+2\,\text{PolyGamma}[2,1]\right)$$

```
Sum[ t[k, 4] / k^3, {k, 1, Infinity}]
```

$$\frac{1}{128}\left(-\text{PolyGamma}\left[2,\frac{1}{4}\right]-\text{PolyGamma}\left[2,\frac{1}{2}\right]-\text{PolyGamma}\left[2,\frac{3}{4}\right]+3\,\text{PolyGamma}[2,1]\right)$$

```
Sum[ t[k, 5] / k^3, {k, 1, Infinity}]
```

$$\frac{1}{250}\left(-\text{PolyGamma}\left[2, \frac{1}{5}\right] - \text{PolyGamma}\left[2, \frac{2}{5}\right] - \text{PolyGamma}\left[2, \frac{3}{5}\right] - \text{PolyGamma}\left[2, \frac{4}{5}\right] + 4\,\text{PolyGamma}[2, 1]\right)$$

```
N[1/128 (-PolyGamma[2, 1/4] - PolyGamma[2, 1/2] - PolyGamma[2, 3/4] + 3 PolyGamma[2, 1])]
```

```
1.12693
```

```
N[1/128 (-(-2 Pi^3 - 56 Zeta[3]) - PolyGamma[2, 1/2] - PolyGamma[2, 3/4] + 3 PolyGamma[2, 1])]
```

```
1.12693
```

```
N[1/128 (-(-2 Pi^3 - 56 Zeta[3]) - (-14 Zeta[3]) - PolyGamma[2, 3/4] + 3 PolyGamma[2, 1])]
```

```
1.12693
```

```
N[1/128 (-(-2 Pi^3 - 56 Zeta[3]) - (-14 Zeta[3]) - (2 Pi^3 - 56 Zeta[3]) + 3 PolyGamma[2, 1])]
```

```
1.12693
```

```
N[1/128 (-(-2 Pi^3 - 56 Zeta[3]) - (-14 Zeta[3]) - (2 Pi^3 - 56 Zeta[3]) + 3 (-2 Zeta[3]))]
```

```
1.12693
```

```
Expand[1/128 (-(-2 Pi^3 - 56 Zeta[3]) - (-14 Zeta[3]) - (2 Pi^3 - 56 Zeta[3]) + 3 (-2 Zeta[3]))]
```

$$\frac{15\,\text{Zeta}[3]}{16}$$

```
N[Zeta[3]]
```

```
1.20206
```

```
N[Sum[ t[k, 4] / k^3, {k, 1, Infinity}]]
```

```
1.12693
```

```
N[PolyGamma[2, 1 / 4]]
```

```
-129.328
```

```
(-1)^(2 + 1) (2!) Sum[ 1 / ((1 / 4) + k)^3, {k, 0, Infinity}]
```

$$-2\left(\pi^3 + 28\,\text{Zeta}[3]\right)$$

```
Sum[ 1 / ((1 / 4) + k)^3, {k, 0, Infinity}]
```

$$\pi^3 + 28\,\text{Zeta}[3]$$

```
Sum[ 1 / ((1 / 2) + k)^3, {k, 0, Infinity}]
```

$$7\,\text{Zeta}[3]$$

```
Sum[ 1 / ((1 / 6) + k)^3, {k, 0, Infinity}]
```

$$2\sqrt{3}\ \pi^3 + 91\,\text{Zeta}[3]$$