```
Limit[ Gamma[s] - (-1)^s Log[n]^s / s, {s → 0}]
```

$$\{-\text{EulerGamma} - i\pi - \text{Log}[\text{Log}[n]]\}$$

```
f[s_] := Log[10]^s / s
```

```
f[.001]
```

1000.83

```
Limit[ Gamma[s] - Log[n]^s / s, {s → 0}]
```

$$\{-\text{EulerGamma} - \text{Log}[\text{Log}[n]]\}$$

```
Limit[ (-1)^s (a - 1)^s Sum[ (a^k - 1) (k^(s - 1)), {k, 1, Log[a, n]}], {s → 0}]
```

$$\left\{-\text{EulerGamma} - a\, n\, \text{LerchPhi}\left[a,\ 1,\ 1 + \frac{\text{Log}[n]}{\text{Log}[a]}\right] - \text{Log}[1 - a] - \text{PolyGamma}\left[0,\ 1 + \frac{\text{Log}[n]}{\text{Log}[a]}\right]\right\}$$

```
Limit[ (-1)^s (a - 1)^s Sum[ (a^k - 1) (k^(s - 1)), {k, 1, Log[a, n]}], {s → 1}]
```

$$\left\{\frac{1}{2}\left(1 + a - 2\, a\, n - 2\, (-1 + a)\, \text{HurwitzZeta}\left[0,\ 1 + \frac{\text{Log}[n]}{\text{Log}[a]}\right]\right)\right\}$$

```
Limit[-EulerGamma - Log[1 - a] - PolyGamma[0, 1 + Log[n]/Log[a]], a → 1]
```

$$\text{Limit}\left[-\text{EulerGamma} - \text{Log}[1 - a] - \text{PolyGamma}\left[0,\ 1 + \frac{\text{Log}[n]}{\text{Log}[a]}\right],\ a \to 1\right]$$

```
Limit[ Gamma[s] - (-1)^s ((1 - t) Log[n])^s / s, {s → 0}]
```

$$\{-\text{EulerGamma} - i\pi - \text{Log}[-(-1 + t)\, \text{Log}[n]]\}$$

```
Limit[Gamma[s] - 1 / s, {s → 0}]
```

$$\{-\text{EulerGamma}\}$$

```
Limit[Gamma[s] - Log[n]^s / s, {s → 0}]
```

$$\{-\text{EulerGamma} - \text{Log}[\text{Log}[n]]\}$$

```
Limit[(Log[n]^s - 1) / s, {s → 0}]
```

$$\{\text{Log}[\text{Log}[n]]\}$$

```
Sum[(Log[n] - 1)^k / k (-1)^(k + 1), {k, 1, Infinity}]
```

$$\text{Log}[\text{Log}[n]]$$

```
Sum[-(1 - Log[n])^k / k , {k, 1, Infinity}]
```

$$\text{Log}[\text{Log}[n]]$$