```
Sum[ (x - 1) Log[x]^k BernoulliB[k] / (k!), {k, 0, Infinity}]
```

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

```
Sum[ (x - 1) Log[x]^(k + a - 1) BernoulliB[k] / (k!), {k, 0, Infinity}]
```

$$\text{Log}[x]^a$$

```
Sum[ Log[x]^(k + a) / (k!), {k, 1, Infinity}]
```

$$(-1 + x)\ \text{Log}[x]^a$$

```
Sum[ Log[x]^(k + a) / (k!), {k, 0, Infinity}]
```

$$x\ \text{Log}[x]^a$$

```
Sum[ Log[x]^(k + 1) / (k!), {k, 0, Infinity}]
```

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

```
Table[ Limit[ D[ x / Log[x + 1], {x, k}], x → 0] / (k!), {k, 0, 10}]
```

$$\left\{1, \frac{1}{2}, -\frac{1}{12}, \frac{1}{24}, -\frac{19}{720}, \frac{3}{160}, -\frac{863}{60\,480}, \frac{275}{24\,192}, -\frac{33\,953}{3\,628\,800}, \frac{8183}{1\,036\,800}, -\frac{3\,250\,433}{479\,001\,600}\right\}$$

```
FullSimplify[
 Sum[ (x - 1)^(k + a) Log[x] SeriesCoefficient[Series[ x / Log[1 + x], {x, 0, 40}], k],
   {k, 0, 35}] /. x → .25]
```

$$-0.75\ (-0.75)^a$$

```
Sum[ (x - 1) Log[x]^k BernoulliB[k] / (k!), {k, 0, Infinity}]
```

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

```
-0.75 (-0.75`)^a
```

$$(-0.75)^{1+a}$$

```
FullSimplify[
 Sum[ (x - 1)^(k + a) Log[x] SeriesCoefficient[Series[ x / Log[1 + x], {x, 0, 40}], k],
   {k, 0, 35}] /. x → .4]
```

$$-0.6\ (-0.6)^a$$

```
-0.6 (-0.6`)^a
```

$$(-0.6)^{1+a}$$

```
Sum[ (E^x - 1) x^(k + a - 1) BernoulliB[k] / (k!), {k, 0, Infinity}]
```

$$x^a$$

```
Sum[ x^(k) BernoulliB[k] / (k!), {k, 0, Infinity}]
```

$$\frac{x}{-1 + e^x}$$

```
FullSimplify[
 Sum[ (x)^(k) SeriesCoefficient[Series[ x / Log[1 + x], {x, 0, 40}], k], {k, 0, 35}] /. x → .4]
```

$$1.18881$$

```
.4 / Log[1 + .4]
```

```
1.18881
```