```
f1[y_, s_] := -Log[y]^s Integrate[ y^x (-x)^(s - 1), {x, 0, 1}]
f2[y_, s_] := Gamma[s, 0, -Log[y]]

N[f1[10, 6]]
```

185.331

```
N[f2[10, 6]]
```

$185.331 - 1.36179 \times 10^{-13}\, i$

```
f1a[y_, s_, n_] := -Log[y]^s Integrate[ y^(n x) (n (-x))^(s - 1), {x, 0, 1}]
f2a[y_, s_, n_] :=  Gamma[s, 0, -n Log[y]] / n
```

```
f1b[y_, s_, n_] := -(n)^(s - 1) Log[y]^s Integrate[ y^(n x) (-x)^(s - 1), {x, 0, 1}]
f2b[y_, s_, n_] :=  Gamma[s, 0, -n Log[y]] / n

N[f1b[5, 4, 3]]
```

2735.03

```
N[f2b[5, 4, 3]]
```

$2735.03 - 1.0041 \times 10^{-12}\, i$

```
f1c[y_, s_, n_] := -Log[y]^s Integrate[ y^(n x) (-x)^(s - 1), {x, 0, 1}]
f2c[y_, s_, n_] := Gamma[s, 0, -n Log[y]] / n / n^(s - 1)

N[f1c[5, 3, 4]]
```

-298.496

```
N[f2c[5, 3, 4]]
```

$-298.496 + 7.3118 \times 10^{-14}\, i$

```
f1d[y_, s_, n_] := -Log[y]^s Integrate[ y^(n x) (-x)^(s - 1), {x, 0, 1}]
f2d[y_, s_, n_] :=  Gamma[s, 0, -n Log[y]] / n^s

N[f1d[3, 3, 3]]
```

-6.19679

```
N[f2d[3, 3, 3]]
```

$-6.19679 + 1.53592 \times 10^{-15}\, i$

```
f1e[y_, s_] :=  -Log[y]^s Integrate[Sum[ y^(n x), {n, 1, Infinity}] (-x)^(s - 1), {x, 0, 1}]
f2e[y_, s_] := Sum[ Gamma[s, 0, -n Log[y]] / n^s , {n, 1, 100 000}]

N[f1e[.5, 3]]
```

0.189506

```
N[f2e[.5, 3]]
```

0.189506

```
f1f[y_, s_] := -Log[y]^s Integrate[(-y^x/(-1+y^x)) (-x)^(s-1), {x, 0, 1}]
f2f[y_, s_] := Sum[Gamma[s, 0, -n Log[y]] / n^s , {n, 1, 100 000}]
N[f1f[.5, 3]]
```

```
0.189506
```

```
N[f2f[.5, 3]]
```

```
0.189506
```

```
Sum[ y^(n x), {n, 1, Infinity}]
```

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

```
N[Log[100]^s Integrate[ 100^x x^(s-1), {x, 0, 1}] /. s → 2]
```

```
361.517 - 4.41506 × 10^-14 i
```

```
N[Abs[ Gamma[2, 0, -Log[100]]]]
```

```
361.517
```

```
FullSimplify[Log[100]^s Integrate[ 100^-x x^(s-1), {x, 0, 1}] /. s → 2]
```

```
1 - Gamma[2, Log[100]]
```

```
Log[100]^s Integrate[ 100^x (-x)^(s-1), {x, 0, 1}] /. s → 5
```

```
-24 + Gamma[5, -2 Log[10]]
```