```
DD[k_, a_, n_] :=
 Sum[Binomial[k, j] DD[k - j, m + 1, Floor[n / (m^j)]], {m, a, n^(1 / k)}, {j, 1, k}]
DD[1, a_, n_] := Floor[n] - a + 1
DD[0, a_, n_] := 1
DS[n_, k_] := DD[k, 2, n]
DDD[n_, k_] := Sum[DDD[n / j, k - 1], {j, 2, n}]
DDD[n_, 0] := 1
D2[1, a_, n_, p_, r_] := n - a + 1
D2[2, a_, n_, p_, r_] := p / ((r + 1) (r + 2)) + (Floor[n / a] - a) (p / (r + 1)) +
  (Floor[n^(1 / 2)] - a) (p / 2) + p Sum[Floor[n / m] - m, {m, a + 1, n^(1 / 2)}]
D2[k_, a_, n_, p_, r_] := D2[k - 1, a, n / a, p / (r + 1), r + 1] +
  Sum[D2[k - 1, m, n / m, p, 1], {m, a + 1, n^(1 / k)}]
DD2[n_, k_] := D2[k, 2, n, k!, 0]
D3[1, a_, n_, p_, r_] := p / (r + 1) + p (Floor[n] - a)
D3[k_, a_, n_, p_, r_] :=
 D3[k - 1, a, n / a, p / (r + 1), r + 1] + Sum[D3[k - 1, m, n / m, p, 1], {m, a + 1, n^(1 / k)}]
DD3[n_, k_] := D3[k, 2, n, k!, 0]
D4[1, a_, n_, p_, r_] := p (Floor[n] - a + 1) - p / (r + 1)
D4[k_, a_, n_, p_, r_] :=
 Sum[D4[k - 1, m, n / m, p, 1], {m, a, n^(1 / k)}] - D4[k - 1, a, n / a, p / (r + 1), r + 1]
DD4[n_, k_] := D4[k, 1, n, k!, 0]


DDD[1000, 4]

13 952

DD4[1000, 4]

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D5[1, a_, n_, p_, r_, s_] := s! / p / (r + 1) + (s! / p) (Floor[n] - a)
D5[k_, a_, n_, p_, r_, s_] := D5[k - 1, a, n / a, p (r + 1), r + 1, s + 1] +
  Sum[D5[k - 1, m, n / m, p, 1, s + 1], {m, a + 1, n^(1 / k)}]
DD5[n_, k_] := D5[k, 2, n, 1, 0, 1]

DD5[1000, 3]

11 217

DDD[1000, 3]

11 217

D6[1, a_, n_, p_, r_, s_] := p + (p (r + 1)) (Floor[n] - a)
D6[k_, a_, n_, p_, r_, s_] := D6[k - 1, a, n / a, p, 1, s + 1] +
  Sum[D6[k - 1, m, n / m, p (r + 1), r + 1, s + 1], {m, a + 1, n^(1 / k)}]
DD6[n_, k_] := D6[k, 2, n, 1, 0, 1]

DD6[1000, 3]

10 655

DA[1, n_, a_, k_, p_, r_] := (p / r + p (Floor[n] - a))
DA[s_, n_, a_, k_, p_, r_] := DA[s - 1, n / a, a, k + 1, k p / r, r + 1] +
  Sum[DA[s - 1, n / m, m, k + 1, k p, 2], {m, a + 1, n^(1 / s)}]
DDA[n_, s_] := DA[s, n, 2, 2, 1, 1]
```

```
DDD[1000, 3]
```

11 217

```
DDA[1000, 3]
```

11 217

```
DB[ 1, n_, a_, k_, p_, r_ ] := p (Floor[n] - a + 1) - p / r
DB[s_, n_, a_, k_, p_, r_] := Sum[ DB[s - 1, n / m, m, k + 1, k p, 2], {m, a, n^(1 / s)}] -
  DB[s - 1, n / a, a, k + 1, k p / r, r + 1]
DDB[ n_, s_] := DB[ s, n, 1, 2, 1, 1]
```

```
DDD[1000, 3]
```

11 217

```
DDB[1000, 3]
```

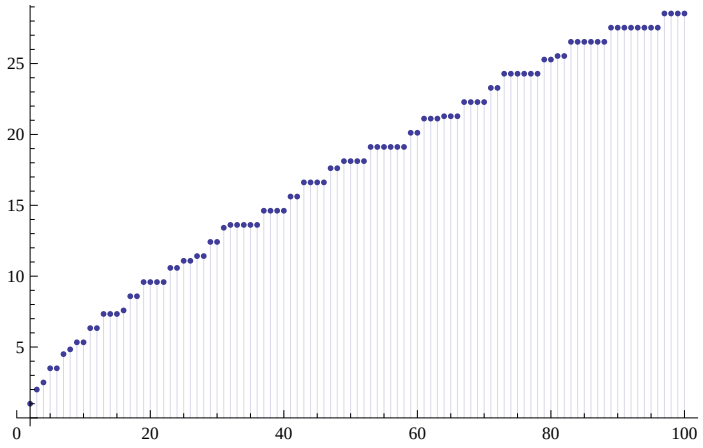
11 217

```
D7[a_, n_, p_, r_, s_] :=
 (s! / p / r + (s! / p) (Floor[n] - a)) / s -
  If[ n^(1 / 2) ≥ a , D7[a, n / a, p r, r + 1, s + 1] +
    Sum[ D7[m, n / m, p, 2, s + 1], {m, a + 1, n^(1 / 2)}], 0]
DD7[ n_] := D7[ 2, n, 1, 1, 1]
```

```
DD7[100]
```

$$\frac{428}{15}$$

```
DiscretePlot[ DD7[n], {n, 2, 100}]
```



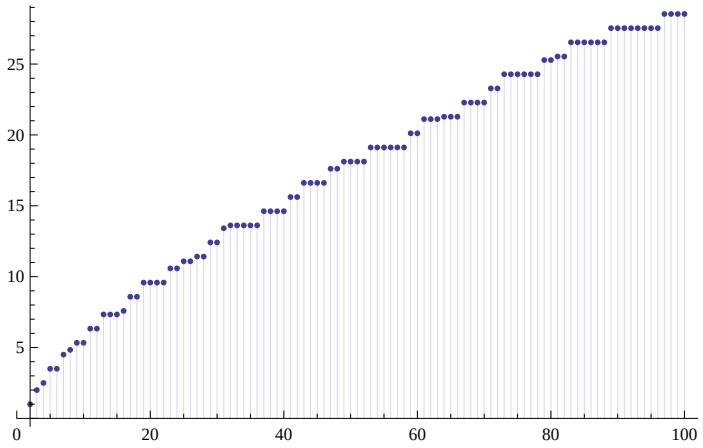

```
D8[n_, a_, k_, p_, r_] :=
 (p / r + p (Floor[n] - a)) / (k - 1) -
  If[ n^(1 / 2) ≥ a , D8[n / a, a, k + 1, k p / r, r + 1], 0] -
  Sum[ D8[n / m, m, k + 1, k p, 2], {m, a + 1, n^(1 / 2)}]
DD8[ n_] := D8[ n, 2, 2, 1, 1]
```

```
DD8[100]
```

$$\frac{428}{15}$$

$$\frac{428}{15}$$

```
DiscretePlot[ DD8[n], {n, 2, 100}]
```




```
DD9[n_, k_, a_] :=
 Sum[ (-1)^(j - 1) Binomial[k, j] DD9[ n / (m^j), k - j, m], {j, 1, k}, {m, a, n^(1 / k)}]
DD9[n_, 0, a_] := 1
DD9[1000, 5, 2]
```

```
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```

```
DDD[1000, 5]
```

```
10 602
```

```
DiscretePlot[DD9[n, 4, 2], {n, 2, 1000}]
```