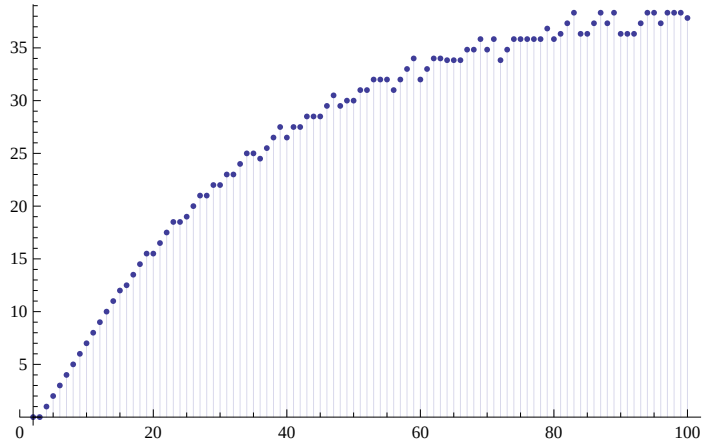
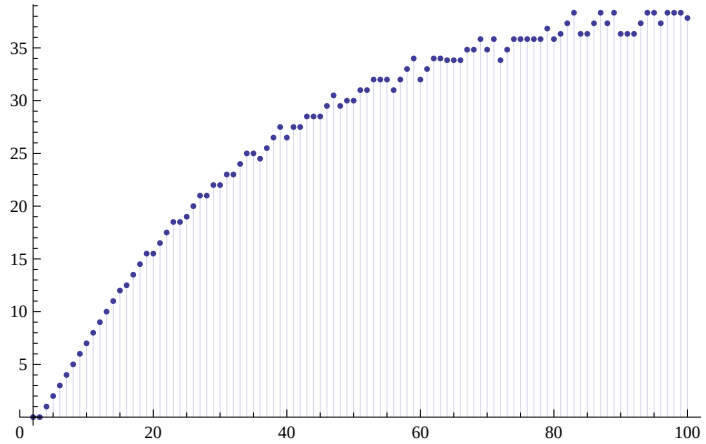
```
Clear[rb]
bin2[z_, k_] := Product[z - j, {j, 0, k - 1}] / k!
rb[n_, k_, a_] := rb[n, k, a] = Sum[rb[Floor[n / j], k - 1, a], {j, a, n}]
rb[n_, 0, a_] := UnitStep[n - 1]
lrb[n_, a_] := Sum[(-1)^(k + 1) / k rb[n, k, a], {k, 1, Log2@n}]
rbz[n_, z_, a_] := Sum[bin2[z, k] rb[n, k, a], {k, 0, Log2@n}]
lrz[n_, z_, a_] := Sin[Pi z] / Pi Sum[ (-1)^k / (z - k) rb[n, k, a], {k, 0, Log2@n}]
px[n_, z_, y_] := If[n < y, 1, Sum[bin2[z, k] px[n / y^k, z - k, y + 1], {k, 0, Log[y, n]}]]
px2[n_, k_, y_] := Sum[(-1)^(k - j) bin2[k, j] px[n, j, y], {j, 0, k}]
pxz[n_, z_, y_] := Sum[bin2[z, k] Limit[lrz[n, j2, y], j2 → k], {k, 0, Log[y, n]}]


DiscretePlot[Limit[D[lrz[n, z, 4], z], z → 0], {n, 2, 100}]
```




```
DiscretePlot[D[px[n, z, 4], z] /. z → 0, {n, 2, 100}]
```




```
Limit[lrz[100, z, 3], z → 3]
```

71

```
px2[100, 3, 3]
```

71

```
Expand@px[100, z, 3]
```

$$1 + \frac{341\,z}{12} + \frac{1391\,z^2}{24} + \frac{139\,z^3}{12} + \frac{z^4}{24}$$

```
Expand@pxz[100, z, 3]
```

$$1 + \frac{341\,z}{12} + \frac{1391\,z^2}{24} + \frac{139\,z^3}{12} + \frac{z^4}{24}$$

```
FullSimplify@Sum[Binomial[z, k] x^(0 k) / k!, {k, 0, Infinity}]
```

```
LaguerreL[z, -1]
```

```
N[D[LaguerreL[z, -(x^2)], z] /. z → 0] /. x → 100.
```

```
9.78756
```