

$$S[N_] := k N \left(\frac{5}{2} + \text{Log} \left[\frac{2 \sqrt{2} \pi^{3/2} (k m T)^{3/2} V}{h^3 N} \right] \right)$$

$$\text{Solve} \left[\frac{2 \sqrt{2} \pi^{3/2} (k m T)^{3/2} V}{h^3 N} == 1, N \right]$$

$$\left\{ \left\{ N \rightarrow \frac{2 \sqrt{2} k m \pi^{3/2} T \sqrt{k m T} V}{h^3} \right\} \right\}$$

$$\text{Solve}[1 / D[S[N], En] == T, En]$$

$$\left\{ \left\{ En \rightarrow \frac{3 k N T}{2} \right\} \right\}$$

$$p V / T == D[S[N], V] V$$

$$\frac{p V}{T} == k N$$

$$\text{Expand}[S'[N]]$$

$$k \text{ Log} \left[\frac{8 \left(\frac{En m}{N} \right)^{3/2} \pi^{3/2} V}{3 \sqrt{3} h^3 N} \right]$$

$$- \frac{3 k T}{2}$$

$$\text{Simplify} \left[k T \text{ Log} \left[\frac{2^{3/N} \left(\frac{En m}{N} \right)^{\frac{3}{2 N}} \left(\frac{\pi}{3} \right)^{\frac{3}{2 N}} V}{h^3 N} \right] \right]$$

$$k T \text{ Log} \left[\frac{8^{\frac{1}{N}} \left(\frac{En m}{N} \right)^{\frac{3}{2 N}} \left(\frac{\pi}{3} \right)^{\frac{3}{2 N}} V}{h^3 N} \right]$$

$$\text{Simplify} \left[k \text{ Log} \left[\frac{8 \left(\frac{En m}{N} \right)^{3/2} \pi^{3/2} V}{3 \sqrt{3} h^3 N} \right] - S[N] / N \right]$$

$$- \frac{5 k}{2}$$

$$\text{Exit}[]$$

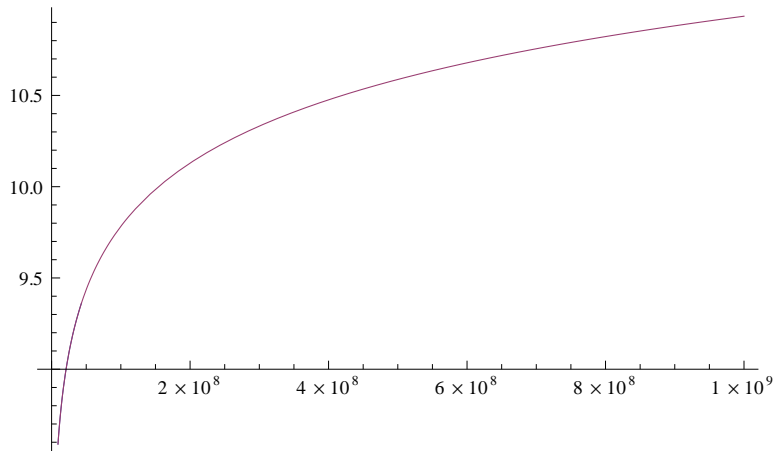
$$\text{DSolve}[\{F'[N] == F[N] / N + k T / 2, F[N0] == F0\}, F[N], N]$$

$$\left\{ \left\{ F[N] \rightarrow \frac{2 F0 N + k N N0 T \text{ Log}[N] - k N N0 T \text{ Log}[N0]}{2 N0} \right\} \right\}$$

Simplify $\left[\frac{2 F_0 N + k N N_0 T \log[N] - k N N_0 T \log[N_0]}{2 N_0} \right]$

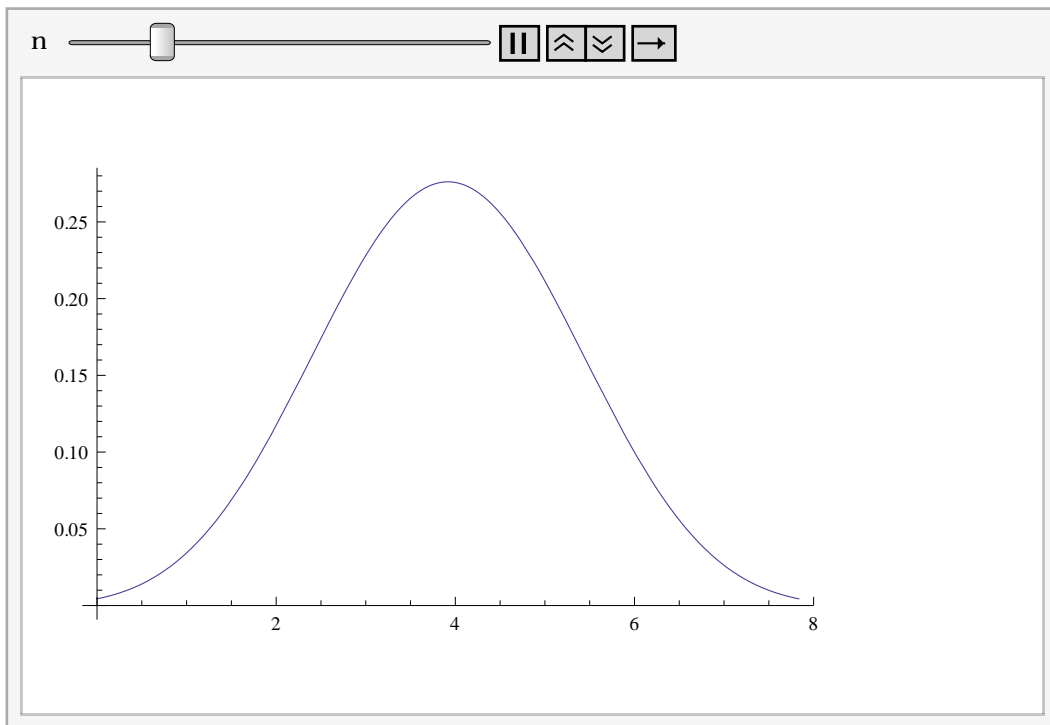
$$\frac{N (2 F_0 + k N_0 T \log[N] - k N_0 T \log[N_0])}{2 N_0}$$

Plot $\{ \{ \log[2^{(2 N)} / (2 N)! * N! * N!], 0.5 \log[\pi N] \}, \{N, 0, 1000000000\} \}$



Animate [

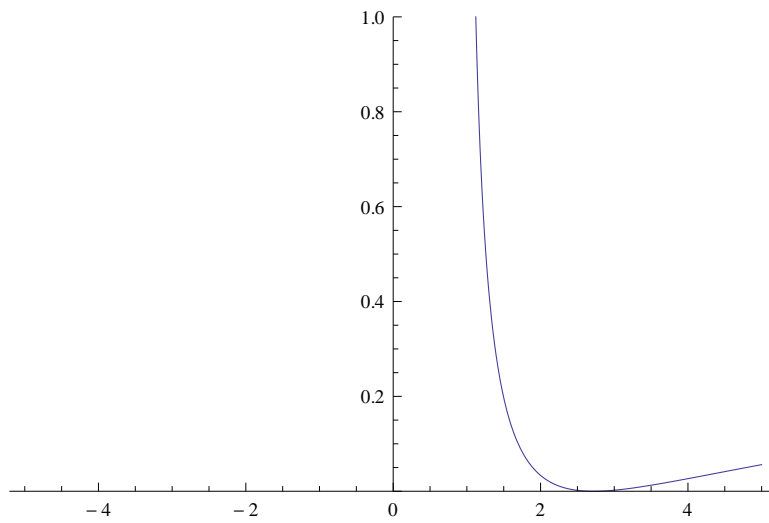
Plot $[(n^2)! / (n^2 - x)! * x! / 2^{(n^2)}], \{x, 0, n^2\}, \text{PlotRange} \rightarrow \text{All}], \{n, 1, 10\}]$



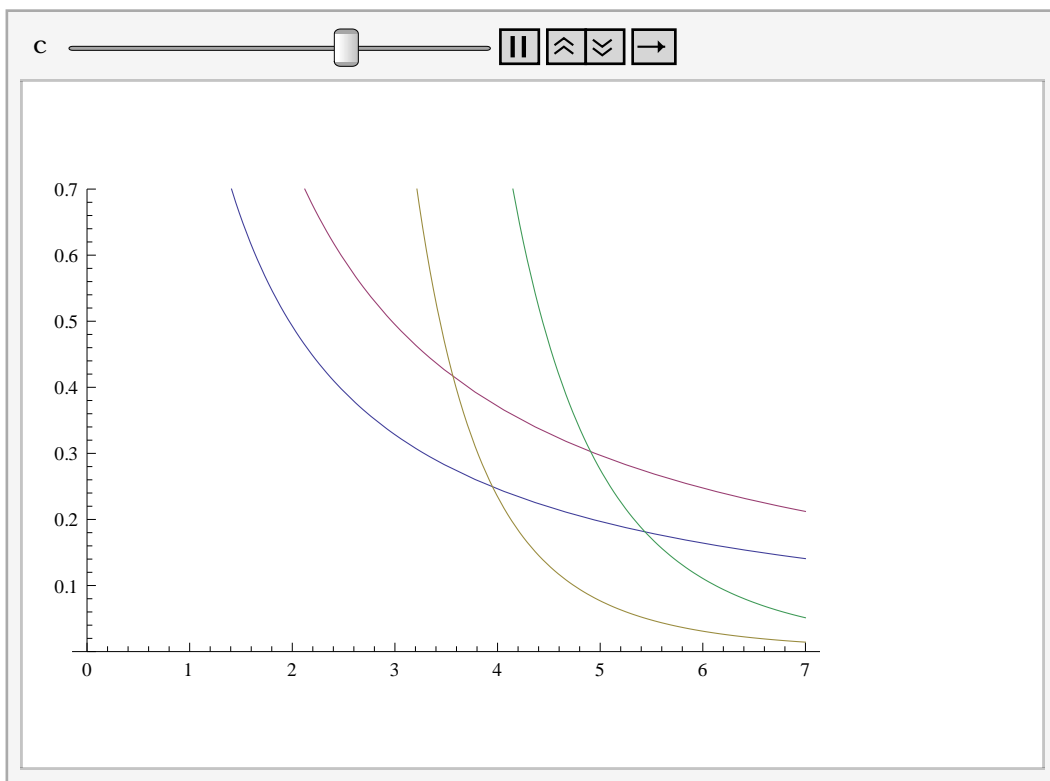
0.4 !

0.887264

```
T = 10 ^ 90; Plot[Log[1 / 4 (1 / Log[x] + Log[x] + 2)], {x, -5, 5}, PlotRange -> {0, 1}]
```



```
Animate[Plot[{c ^ 2 / 3 / 4 / V, (c ^ 2 / 3 + 2) / 4 / V, c ^ 5 / V ^ 5 / 2, (c + 1) ^ 5 / V ^ 5 / 2},
{V, 0, 7}], PlotRange -> {0, 0.7}], {c, 0, 5}]
```



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