Ex.1

In[309]:=
```
Zklass = 10
Zklass2 = 10 * 9
```
Out[309]=
```
10
```
Out[310]=
```
90
```
✓

In[311]:=
```
Zbose = Zklass + 0.5 * Zklass2
```
Out[311]=
```
55.
```
✓

In[312]:=
```
Zfermi = 0.5 * Zklass2
```
Out[312]=
```
45.
```
✓

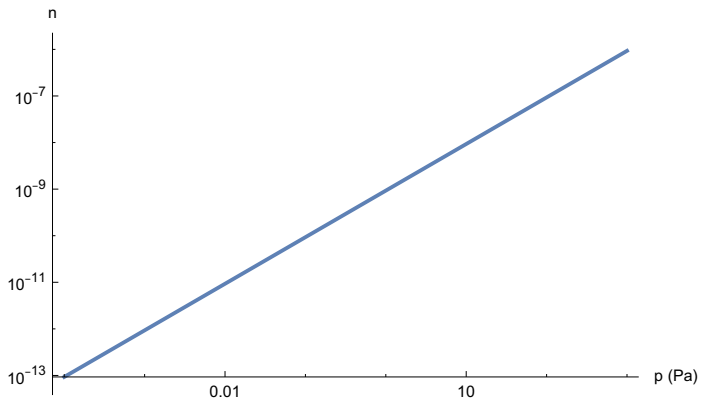
In[313]:=
```
pklass = 0
pbose = 10 / Zbose
pfermi = 0
```
Out[313]=
```
0
```
Out[314]=
```
0.181818
```
Out[315]=
```
0
```
✓ (falls klassisch keine Überlappung)

Ex.2

In[133]:=

```
k := k
dE := 0.7 eV
T := 310 K
Zint := 223
Z := Zint * Exp[-dE / (k * T)]
n[p_] := Z * p / (1 + Z * p)
LogLogPlot[n[p], {p, 0.0001, 1000}, AxesLabel → {"p (Pa)", "n"}]
```

Out[139]=



Ex.3

In[165]:=

```
ClearAll["Global`*"]
eqn := p == R * T / (V - b) - a / V ^ 2
sol = Solve[{eqn, D[eqn, V], D[eqn, {V, 2}]}, {p, T, V}][[1]]
```

Out[167]=

$$\left\{p \to \frac{a}{27\,b^2},\ T \to \frac{8\,a}{27\,b\,R},\ V \to 3\,b\right\}$$

In[228]:=

```
a := 557.29 kPa * dm^6 mol^2
R := R
b := 31 cm^3 mol
Tc = T /. sol // UnitConvert
pc = p /. sol
Vc = V /. sol // N
```

Out[231]=

640.636 K

Out[232]=

21 478. kPa

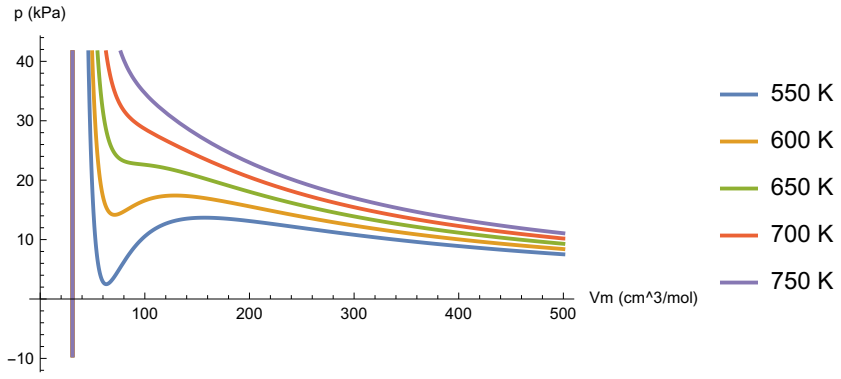
Out[233]=

93. cm^3 mol

In[307]:=

```
p[T_, V_] :=
 1 / 1000 R * T * 1 K / (V * 1 cm^3 mol - b) - 1 / 1000 a / V^2 * 1 mol^2 cm^6
Plot[{p[550, V], p[600, V], p[650, V], p[700, V], p[750, V]},
 {V, 1, 500}, AxesLabel → {"Vm (cm^3/mol)", "p (kPa)"},
 PlotLegends → {"550 K", "600 K", "650 K", "700 K", "750 K"},
 PlotRange → {Automatic, Automatic}]
```

Out[308]=



Nachdem das Volumen nicht negativ sein kann, geht das Integral auch nicht zu 0.

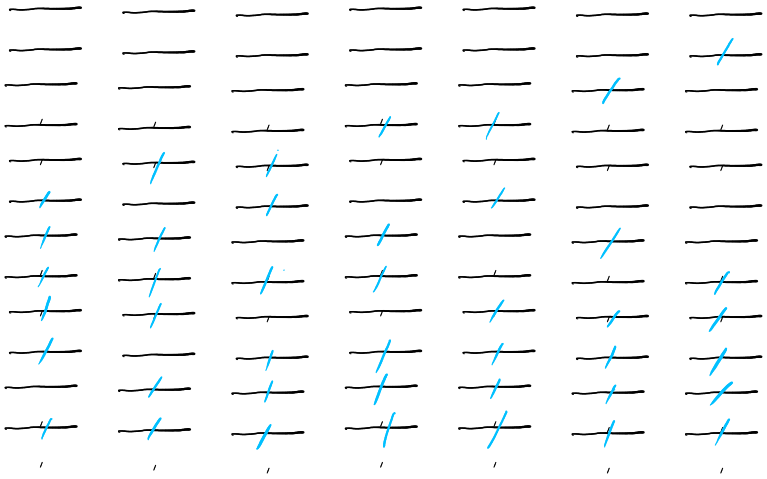
4)

$q = 3$

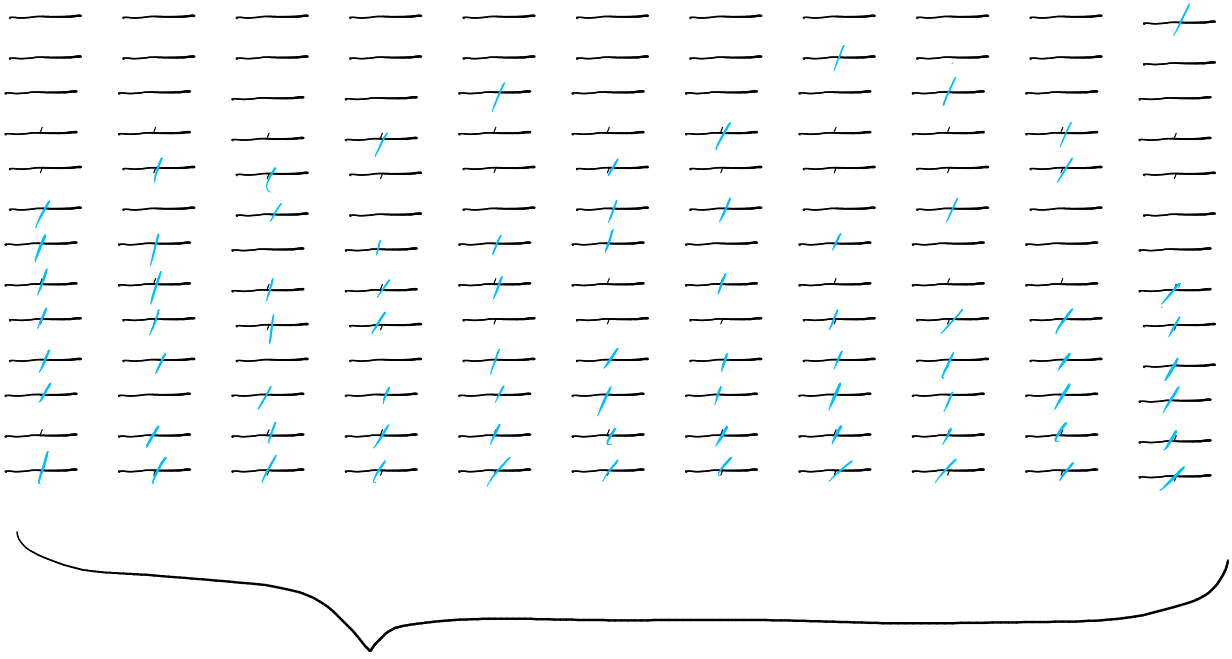
$q = 4$

$q = 5$

ultra zach!



$q = 5$



$q = 6$

11 Möglichkeiten

$p_i = \frac{N_i}{11}$

$S = k_B \ln 11 \approx 2.4\, k_B$