

Aufgabe I

```
Alg1Time[n_] := (n * Log[n, 2]) * 3
Alg2Time[n_] := (1 / 2 * n^2 - 1 / 2 * n) * 1
Alg3Time[n_] := (1 / 2 * n!) * 3 / 2
```

a) Laufzeit für verschiedene Problemgrößen

```
TableForm[Table[N[Apply[f, {i}], 1] ns,
  {i, {10, 100, 1000, 10000}}, {f, {Alg1Time, Alg2Time, Alg3Time}}],
  TableHeadings -> {"10", "100", "1000", "10000"},
  {"3n*log2(n)", "(n2-n)/2", "3/2*n!"}]
```

	$3n \cdot \log_2(n)$	$(n^2 - n) / 2$	$3/2 \cdot n!$
10	9. ns	$5. \times 10^1$ ns	$3. \times 10^6$ ns
100	$5. \times 10^1$ ns	$5. \times 10^3$ ns	$7. \times 10^{157}$ ns
1000	$3. \times 10^2$ ns	$5. \times 10^5$ ns	$3. \times 10^{2567}$ ns
10000	$2. \times 10^3$ ns	$5. \times 10^7$ ns	$2. \times 10^{35659}$ ns

b) Problemgrößen für verschiedene Laufzeiten

```
s := 10^9; m := 60 s; h := 60 * m; d := 24 h; y := (356 + 1 / 4) d
```

```
TableForm[Table[Abs@N[x /. FindInstance[i == f[x], x], 2],
  {i, {s, m, h, d, y}}, {f, {Alg1Time, Alg2Time, Alg3Time}}],
  TableHeadings -> {"second", "minute", "hour", "day", "year"},
  {"3n*log2(n)", "(n2-n)/2", "3/2*n!"}]
```

	$3n \cdot \log_2(n)$	$(n^2 - n) / 2$	$3/2 \cdot n!$
second	1.1×10^{10}	4.5×10^4	16.
minute	7.9×10^{11}	3.5×10^5	19.
hour	5.5×10^{13}	2.7×10^6	20.
day	1.5×10^{15}	1.3×10^7	21.
year	6.1×10^{17}	2.5×10^8	22.