5. $T(n) = 7T(\frac{n}{3}) + n^2$

$a = 7$ $\quad f(n) = n^2$
$b = 3$

Fall 3 $\quad f(n) = \Omega(n^{\log_b a + \varepsilon})$

$n^2 = \Omega(n^{\log_3 7 + \varepsilon})$

$\exists \underset{\varepsilon > 0}{\varepsilon \in \mathbb{R}} : 2 = \log_3 7 + \varepsilon$

$\Rightarrow \varepsilon = 2 - \log_3 7$

und! $\quad 7(\frac{n}{3})^2 \leq c \cdot n^2 \qquad 0 < c < 1$

$7 \frac{n^2}{9} \leq c \cdot n^2$

$\frac{7}{9} \cdot n^2 \leq c \cdot n^2 \qquad$ gilt für $c = \frac{7}{9}$

$\Rightarrow T(n) = \Theta(n^2)$

6. $a = 16 \quad b = 4 \quad f(n) = n!$

Fall 3 $\quad f(n) = \Omega(n^{\log_b a + \varepsilon}) \quad \varepsilon > 0$

$n! = \Omega(n^{\log_4 2 + \varepsilon}) \qquad \varepsilon = 1$

$n! = \Omega(n^3)$ ✓

und $\quad 16 \cdot (\frac{n}{4})! \leq c \cdot n! \qquad 0 < c < 1$

ein solches c existiert nicht

$\Rightarrow$ Mastertheorem nicht anwendbar

8. $2T(\frac{n}{4}) + n^{0,51}$

$f(n) = n^{0,51} \qquad a = 2 \quad b = 4$

$\log_b a = \log_4 2 = \frac{1}{2}$

$n^{0,51} \in \Omega(n^{\frac{1}{2} + \frac{1}{100}}) \qquad \varepsilon = \frac{1}{100}$ ✓

$2(\frac{n}{4})^{0,51} \leq c \cdot n^{0,51} \qquad$ mit $c = 0,99$

$T(n) \in \Theta(n^{0,51})$