1-)

a-) $(n^5 + n^3 + 45)$

$\lim \dfrac{n^5+n^3+45}{n^5} = 1 \Rightarrow \boxed{\in \Theta (n^5)}$

$n^5+n^3+45 \leq n^5+n^5+45n^5$ $\boxed{\in \Theta (n^5)}$

$n \geq 1$

$n=1$ için;

sağlamaktadır

b-) $2n\lg(n+6)^2 + (n+3)^2 \cdot \lg n/2$

$= 2n\lg(n+6)^2 + (n+3)^2 \cdot \lg_2 n/2$

$= 4n\lg(n+6) + 2\lg n/2^{(n+3)}$

$= 4n\lg(n+6) + 2\lg \left(\frac{n}{2}\right)^{(n+3)}$

$= 8\lg\left(\frac{n^2+6n}{2}\right)^{(n+3)}$

$= 8(n+3)\lg \frac{n^2+6n}{2}$ $n(n+6)$

$= \frac{\overset{4}{\cancel{8}}n(n+3)}{2} \lg n+6$

$= 4n^2+12 \lg n+6$

$\boxed{n^2(\log n) \in \Theta\ n^2(\log n)}$

$\log_2 n = a$

$\log_2 n + \log_2 2$

$\log_2 2n$

$\boxed{\in \Theta (2 \cdot \log_2 n)}$

c-) $(\log_2 n)^2 = \log_2 2n$

2 -)

a-) $X(n) = X(n/5) + n \quad , n>1 \quad , X(1) = 1$

$X(n) = X(n/5) + n$

$X(n/5) = X(n/25) + n/5$

$X(n/25) = X(n/125) + n/25$

$X(n/5) = X(n.5^{-3}) + n/25 + n/5$

$X(n) = X(n.5^{-3}) + n/25 + n/5 + n$

$X(n) = X(\underbrace{n/5^{p}}) + 5^{1-p}.n + 5^{2-p}.n + 5^{3-p}.n$

$n(5^{1-p} + 5^{2-p} + 5^{3-p})$

$\frac{n}{5^{p}} = 1$

$n = 5^{p}$

$\boxed{p = \log_5 n}$

$5.5^{-\log_5 n} + 25.5^{-\log_5 n} + 125.5^{-\log_5 n}$

$n.\left(\frac{5}{n} + \frac{25}{n} + \frac{125}{n}\right)$

$1 + n^{2}\left(\frac{155}{\cancel{n}}\right) \Longrightarrow \boxed{\varepsilon\,\Theta(n)}$

b-) $X(n) = 2X(n-3) \quad , n>1 \quad , X(1) = 1$

$X(n) = 2X(n-3) \longrightarrow 2X(n-3)$

$X(n-3) = 2X(n-6)$

$X(n) = 2.(2X(n-6)) \longrightarrow 4X(n-6)$

$X(n) = 4.X(n-6)$

$X(n-6) = 4.X(n-12)$

$X(n) = 4^{2}.X(n-12) \longrightarrow 16X(n-12)$

$X(n-12) = 4^{2}.X(n-24)$

$X(n) = 4^{2}\,4^{2}X(n-24)$

$2^{2^{p}}.X(\underbrace{n-2^{p}.3}_{1}) = \frac{6n-2}{3}$

$\boxed{= 2n - \frac{2}{3}}$

$\varepsilon\,\Theta(2^{n})$

$n - 2^{p} = \frac{1}{3} \quad p = \log_2 \frac{3n-1}{3}$

$\frac{3n-1}{3} = +2^{p}$

c-)

X

X

X

X

c-) $X(n) = 2X(n-2) - n$, $X(0) = 0$

$X(n) = 2X(n-2) - n$

$X(n-2) = 2X(n-4) - (n-2)$

$X(n-4) = 2X(n-6) - (n-4)$

$X(n-6) = 2X(n-8) - (n-6)$

$X(n-2) = 2\left(2X(n-6) - (n-4)\right) - (n-2)$

$2^2 (2^X(n-8) - n-6) - 2(n-4) - (n-2)$

$2^3 (n-8) - 4(n-4) - 2(n-4) - (n-2)$

$T(n) = 2(2^3 X(n-8) - 4(n-6) - 2(n-4) - (n-2) - n$

$2^P T(n-2^P) - \sum_{Z=1}^{P-1} 2^Z . (n-2Z)$ $\quad P = \frac{n-1}{2}$

$\boxed{\mathcal{E} \Leftrightarrow (n . 2^{n/2} + 1)}$

d-) $T(n) = 2T(n-1) + 5$

$T(n-1) = 2(2(T(n-3)+1) + 1 + 5$

$= 2^2 T(n-3) + 2^2 + 2 + 1$

$T(n) = 2 . T(n-P) + 2^P + 2^{P-1} + 2^1 + 1$

$2^P \underbrace{T(n-P)}_{} + 2^{P-1} - 2 + 1$

$n - P = 0$

$\boxed{P = n}$

$= 2^P . 1 + 2^P + 1$

$\boxed{\mathcal{E} \Leftrightarrow (2^n)}$

e-) $T(n) = T(n/3) + 1 \qquad T(1) = 1$

$T(n/3) = T(n/9) + 1$

$T(n/9) = T(n/81) + 1$

$T(n) = T(\underbrace{n/81}_{1}) + 3$

$n/3^i = 1$

$n = 3^i$

$i = \log_3 n$

$\in \Theta \log_3 n$

veya

$\boxed{\in \Theta(n)}$