$T(n) = 4T(n-2) + n2^n + 4*3^n$

$x^n = 4x^{n-2}$
$x^2 = 4$
$x = \pm 2$

Нехомогенна част

$\sum_{1}^{k} p_i(n) * a_i^n,\ a_i \neq a_j$ при $i \neq j$

$T(n) = 4T(n-2) + n2^n + 4*3^n + n^2*3^n$
$T(n) = 4T(n-2) + n2^n + \left(4 + n^2\right)*3^n$

$T(n) = c1*3^n + \left(c2 + c3*n + c4*n^2\right)2 + c5*(-2)^n$

$T(n) = T(n-1) + 1$

$T(n) = T(n-1) + 1 =$
$= T(n-2) + 1 + 1 =$
$= T(n-3) + 1 + 1 + 1 =$
$= T(n-4) + 1 + 1 + 1 + 1 =$
.....
$= T(0) + 1 + 1 + \ldots + 1 =$
$= T(0) + n*1 = \theta(n)$

$$T(n) = T(n-1) + \frac{1}{n}$$

$$T(n) = T(n-1) + \frac{1}{n} =$$
$$= T(n-2) + \frac{1}{n-1} + \frac{1}{n} =$$
$$= T(n-3) + \frac{1}{n-2} + \frac{1}{n-1} + \frac{1}{n} =$$
$$= T(0) + \frac{1}{1} + \frac{1}{2} + \ldots + \frac{1}{n-1} + \frac{1}{n} =$$

$$= T(0) + \sum_{i=1}^{n} \frac{1}{i} = \theta(lg\ n)$$

$$T(n) = 2T(n-1) + \frac{1}{n}$$

$$T(n) = 2T(n-1) + \frac{1}{n} =$$
$$= 2\left(2T(n-2) + \frac{1}{n-1}\right) =$$
$$= 4T(n-2) + \frac{2}{n-1} + \frac{1}{n} =$$

$$= 4\left(2T(n-3) + \frac{1}{n-2}\right) + \frac{2}{n-1} + \frac{1}{n} =$$
$$= 8T(n-3) + \frac{4}{n-2} + \frac{2}{n-1} + \frac{1}{n} =$$

...

$$= 2^{n}T(0) + \frac{2^{n-1}}{1} + \ldots + \frac{4}{n-2} + \frac{2}{n-1} + \frac{1}{n} =$$

$$= 2^n T(0) + \sum_{i=1}^{n} \frac{2^{n-i}}{i} =$$

$$\sum_{i=1}^{n} \frac{2^{n-i}}{i} = 2^n \sum_{i=1}^{n} \frac{2^{n-i}}{i} \frac{1}{2^n} = 2^n \sum_{i=1}^{n} \frac{1}{i*2^i}$$

$$\sum_{i=1}^{n} \frac{1}{i*2^i} \leqslant \sum_{i=1}^{n} \frac{1}{2^i} \leqslant \sum_{i=1}^{\infty} \frac{1}{2^i} \leqslant 1$$

$$2^n \sum_{i=1}^{n} \frac{1}{i*2^i} \leqslant 2^n$$

$$2^n \sum_{i=1}^{n} \frac{1}{i*2^i} = O\left(2^n\right)$$

$$= 2^n T(0) + \sum_{i=1}^{n} \frac{2^{n-i}}{i} = 2^n T(0) + 2^n \sum_{i=1}^{n} \frac{1}{i*2^i} =$$
$$\theta\left(2^n\right) + O\left(2^n\right) = \theta\left(2^n\right)$$

$$T(n) = \frac{n}{n+1} T(n-1) + 1$$

$$T(n) = \frac{n}{n+1} T(n-1) + 1 =$$
$$= \frac{n}{n+1}\left(\frac{n-1}{n} T(n-2) + 1\right) + 1 =$$
$$= \frac{n-1}{n+1} T(n-2) + \frac{n}{n+1} + 1 =$$

$$= \frac{n-1}{n+1}\left(\frac{n-2}{n-1} T(n-3) + 1\right) + \frac{n}{n+1} + 1 =$$

$$= \frac{n-2}{n+1} T(n-3) + \frac{n-1}{n+1} + \frac{n}{n+1} + \frac{n+1}{n+1} =$$

...

$$= \frac{1}{n+1}T(0) + \frac{2}{n+1} + \dots + \frac{n+1}{n+1} =$$

$$= \frac{1}{n+1}(T(0) + 2 + 3 + 4 + \dots + n + (n+1)) =$$

$$= \frac{1}{n+1}(T(0) - 1 + 1 \ + 2 + 3 + 4 + \dots + n + (n+1)) =$$

$$= \frac{1}{n+1}\left(T(0) - 1 + \frac{(n+1)(n+2)}{2}\right) \asymp \frac{n^2}{n} = n$$

$$T(n) = 2T\left(\sqrt{n}\right) + 1$$

$$n \ = 2^{2^m}$$
$$m \ = \ lg\ lg\ n$$

$$S(m) = T(n) = T\left(2^{2^m}\right) = 2T\left(\sqrt{n}\right) + 1 = 2T\left(n^{\frac{1}{2}}\right) + 1 =$$
$$2T\left(\left(2^{2^m}\right)^{1/2}\right) + 1 = 2T\left(2^{2^{m-1}}\right) + 1 = 2S(m-1) + 1$$

$$S(m) = 2S(m-1) + 1$$
$$S(m) = \theta\left(2^m\right)$$
$$T(n) = S(m) = \theta\left(2^m\right) = \theta\left(2^{lg\ lg\ n}\right) = \theta(lg\ n)$$

$$T(n) = T(n-2) + 2\ lg\ n$$