**ПОКАЗАТЕЛЬНЫЕ УРАВНЕНИЯ**

27 – 3х = $\left(\frac{1}{2}\right)^{х-4}$; $\left(\frac{2}{9}\right)^{2х+3}$ = 4,5х – 2;

4х – 14 ⋅ 2х – 32 = 0; 9х – 6 ⋅ 3х – 27 = 0;

9– х = 27; 5х + 1 – 3 ⋅ 5х – 2 = 122;

$\frac{1}{8}$ $\sqrt{2^{х-1}}$ = 4– 1,25; 9х – 2 ⋅ 3х = 63;

8– х = 16; (0,2)2х – 1 + 4 ⋅ (0,2)2х – 2 – (0,2)2х – 3 = – 0,8;

102х = 0,1 ⋅ $\sqrt{1000}$; 3х + 1 – 4 ⋅ 3х – 2 = 69;

2х + 2х – 3 = 18; 4х – 3 ⋅ 2х = 40;

$\left(\frac{1}{3}\right)^{х}$ + 3х + 3 = 12; $\left(\frac{1}{2}\right)^{2х^{2}+3х-1}$ = 4х – 3;

3х  + 4 ⋅ 3х + 1 = 13; 0,53 – 2х + 3 ⋅ 0,251 – х = 7;

0,23 – 2х + 3 ⋅ 0,042 – х = 8; 2 ⋅ 3х – 6 + 6 ⋅ 90,5х – 2 = 56;

5 ⋅ 9х + 3 ⋅ 25х = 8 ⋅ 15х; 4 ⋅ 91,5х – 1 – 27х – 1 = 33;

$25^{tg^{2}x}+125=6 ∙ 5^{\frac{1}{cos^{2}x}}$; $9^{ctg^{2}x}+3^{\frac{1}{sin^{2}x}}$ = 108;

4x + 1 + 6 ⋅ 4x = 3x + 2 + 3x; 2 ⋅ 81x = 36x + 3 ⋅ 16x;

$2^{x^{2}+2x} ∙ 3^{x^{2}+2x}$ = 216x + 2; $7^{cos^{2}x}+ 7^{sin^{2}x}$ = 8;

$2^{\cos(x)}∙ 2^{cos^{2}x}$ $∙ 2^{cos^{3}x} ∙$ … = 2; 2x – 2 = 3x – 2.

**РЕШИТЕ ГРАФИЧЕСКИ НЕРАВЕНСТВА**

$\left(\frac{1}{4}\right)^{х}$ ≥ 2*х* + 1; $\left(\frac{1}{2}\right)^{х}$ ≤ 2; 2х ≤ 3 – *х*; 2х ≥ $\frac{1}{2}$;

$\left(\frac{1}{3}\right)^{х}$ > 2х; $\left(\frac{1}{3}\right)^{х}$ ≤ 2*х* + 5; 3х ≥ 4 – *х*; 3х < (0,5)х.

**ПОКАЗАТЕЛЬНЫЕ НЕРАВЕНСТВА**

0,7х < 2$\frac{2}{49}$; $\left(\frac{1}{4}\right)^{х}$ – 3 ⋅ $\left(\frac{1}{2}\right)^{х}$ + 2 > 0; 0,9 ≥ 1$\frac{19}{81}$;

$\left(\frac{1}{3}\right)^{2х}$ – 6 ⋅ $\left(\frac{1}{3}\right)^{х}$ – 27 ≤ 0; $\left(cos\frac{π}{3}\right)^{x-0,5}$ > $\sqrt{2}$; $4^{0,5x^{2}-3}$ > 8;

$9^{\left|x+1\right|}$ > 3; $25^{\frac{1}{\left(2x\right)+1}}$ < $125^{- \frac{2}{3}}$; $27^{\frac{1}{\left(3x\right)+2}}$ > $\left(\frac{1}{81}\right)^{- \frac{1}{2}}$;

$\left(\frac{1}{2}\right)^{3-2х}$ ≤ $\left(\frac{1}{3}\right)^{-2}$; 3x – 2 + $\frac{9}{3^{x-2}}$ = 10; $\left(\frac{2}{3}\right)^{х}$ + $\left(\frac{2}{3}\right)^{x-1}$> 2,5;

5x + 5 ⋅ 5– x ≤ 6; 4x – 2x ≥ 2; 9x – 3x ≤ 6;

$\left(tg\frac{π}{3}\right)^{x-1}$< 9– 0,5; $9^{0,5x^{2}-3}$ < 27; $4^{\left|x-1\right|}$ < 8;

$3^{\left|x\right|+2}$ < 27; $\left(\frac{1}{4}\right)^{х}$ – 21 – x – 8 < 0; $3^{x^{2}}$ > 98;

$\left(\frac{1}{9}\right)^{х}$ – 31 – x + 6 < 0; 4x + $\left(\frac{1}{2}\right)^{-1-x}$ – 8 ≥ 0; $7,3^{\frac{\left(x^{2}+2x-15\right)}{\left(x-4\right)}}$ > 1;

22x + 2x ≤ 2; 42x – 4x ≥ 2; 22x – 1 + 22x – 2 + 22x – 3 < 448;

4x – 2x + 1 – 8 > 0; 36x – 5 ⋅ 6x – 6 ≤ 0; 7 ⋅ 22x + 22x + 1 ≤ 32x + 1 + 32x.

**РЕШИТЕ ГРАФИЧЕСКИ УРАВНЕНИЯ**

$\left(\frac{1}{3}\right)^{х}$ = *х* + 1; $\left(\frac{3}{4}\right)^{х-1}$ = 2*х* – 1; $\left(\frac{1}{3}\right)^{х}$ = *х* + 3;

22х = 5 – *х*; 3х = 4 – *х*; 4х = 5 – *х*.

**СИСТЕМЫ ПОКАЗАТЕЛЬНЫХ УРАВНЕНИЙ**

 $\left\{\begin{array}{c}3^{2у-х}=\frac{1}{81}; \\3^{x-y+2}=27.\end{array}\right.$ $\left\{\begin{array}{c}6^{3x-y}=\sqrt{6};\\2^{y-2x}=\frac{1}{\sqrt{2}}.\end{array}\right.$ $\left\{\begin{array}{c}\left(\frac{1}{5}\right)^{4x-y}=25;\\7^{9x-y}=\sqrt{7}.\end{array}\right.$

 $\left\{\begin{array}{c}2^{x}+\left(\frac{1}{3}\right)^{y}=5; \\2^{2x}+\left(\frac{1}{3}\right)^{2y}=13.\end{array}\right.$ $\left\{\begin{array}{c}4^{\cos(x)}+\left(\frac{1}{2}\right)^{\sin(y)}=3; \\4^{\cos(x)}∙\left(\frac{1}{2}\right)^{\sin(y)}=2. \end{array}\right.$ $\left\{\begin{array}{c}2^{x}+2^{y}=6;\\x+y=3. \end{array}\right.$

 $\left\{\begin{array}{c}3^{x}-2^{2y}=77;\\3^{0,5x}-2^{y}=7.\end{array}\right.$ $\left\{\begin{array}{c}4^{x+y}=16; \\4^{x+2y-1}=1.\end{array}\right.$ $\left\{\begin{array}{c}5^{x+y}=125; \\4^{\left(x-y\right)^{2}-1}=1.\end{array}\right.$

 $\left\{\begin{array}{c}3^{x}+3^{y}=12;\\6^{x+y}=216. \end{array}\right.$ $\left\{\begin{array}{c}x+y=6;\\y^{x^{2}-7x+12}=1.\end{array}\right.$ *y* > 0 $\left\{\begin{array}{c}3^{x} ∙ 5^{y}=75;\\3^{y} ∙ 5^{x}=45.\end{array}\right.$

 $\left\{\begin{array}{c}3^{x+y}+3^{x}+3^{y}=7;\\3^{2x+y}+3^{x+2y}=12.\end{array}\right.$ $\left\{\begin{array}{c}x+y=5;\\4^{x}+4^{y}=80.\end{array}\right.$ $\left\{\begin{array}{c}4^{x+y}=128;\\5^{3x-2y-3}=1.\end{array}\right.$

 $\left\{\begin{array}{c}x-y=11;\\x^{y^{2}-5y+6}=1.\end{array}\right.$ (*x* > 0) $\left\{\begin{array}{c}5^{3x}=5^{4y+7};\\2^{x} ∙ 4^{y}=16.\end{array}\right.$ $\left\{\begin{array}{c}3^{x}-5 ∙ 2^{y}=4001;\\3 ∙ 2^{y}+3^{x}=8097.\end{array}\right.$

 $\left\{\begin{array}{c}5^{x} ∙ 5^{y}=3125;\\5^{x}+ 5^{y}=150. \end{array}\right.$ $\left\{\begin{array}{c}2 ∙ 3^{x}=18;\\4^{x} ∙ 5^{y}=16.\end{array}\right.$ $\left\{\begin{array}{c}2^{x}+ 3^{y}=7; \\2^{2x}+ 3^{2y}=25.\end{array}\right.$

 $\left\{\begin{array}{c}2^{\cos(x)}+4^{\sin(y)}=3;\\2^{\cos(x)}∙ 4^{\sin(y)}=2.\end{array}\right.$

**ПОКАЗАТЕЛЬНАЯ ФУНКЦИЯ**

1. Постройте график функции и сформулируйте её свойства:

 а) *у* = 2х; б) *у* = $\left(\frac{1}{2}\right)^{х}$.

2. Сравните числа:

 а) $\left(0,5\right)^{\sqrt{2}}$ и $\left(0,5\right)^{\sqrt{3}}$; в) $\left(0,5\right)^{-3}$ и $\left(0,5\right)^{-π}$; д) 30,7 и 30,9;

 б) $\left(0,5\right)^{0,25}$ и $\left(0,5\right)^{0,45}$; г) $3^{\sqrt{5}}$ и $3^{\sqrt{7}}$; е) 3– 7 и 3– 9.

3. Расположите числа $\left(0,5\right)^{\sqrt{2}}$, $\left(0,5\right)^{\sqrt{3}}$, $\left(0,5\right)^{-\sqrt{2}}$, $\left(0,5\right)^{-\sqrt{3}}$,$ \left(0,5\right)^{1,5}$ в порядке возрастания.

4. Найдите область значений функции:

 а) *у* = 3х + 1; б) *у* = $\left(\frac{1}{4}\right)^{х}$– 1.

5. Постройте схематически график функции:

 а) *у* = $\left(\frac{1}{5}\right)^{х-3}$; б) *у* = $\left(\frac{1}{4}\right)^{х}$– 14 в) *у* = 2х + 6; г) *у* = 3х + 1.

6. Сравните а и b, если:

 а) (9,8)а > (9,8)b; б) (0,6)а < (0,6)b; в) (5,7)а < (5,7)b; г) (0,8)а > (0,8)b.

7. В какой точке график функции *у* = $\left(\frac{2}{3}\right)^{х}$– $\frac{9}{4}$ пересекает ось абсцисс?

8. В какой точке график функции *у* = $\left(\frac{4}{5}\right)^{х}$– 1 пересекает ось ординат?