**Ecuatii exponentiale**

Ecuatia ce contine variabila necunoscuta la exponetul puterii se numeste **ecuatie exponentiala**.

Cea mai simpla ecuatie exponentiala este de forma

|  |  |
| --- | --- |
| *ax = b*, | (1) |

unde *a* > 0, *a*  1.

**Afirmatia 1**. Pentru *b*  0 ecuatia ([1](http://www.math.md/school/rubrica/exp/expe.html#(1))) nu are solutii, iar pentru *b* > 0 ecuatia data are o solutie unica:*x* = log*ab*.

**Exemplul 1**. Sa se rezolve ecuatiile

a) 2*x* = -4,    b) 2*x* = 4,    c) 2*x* = 5.

**Rezolvare.** a) Cum membrul din stanga ecuatiei este pozitiv pentru orice *x*  **R** (a se vedea proprietatile functiei exponentiale), iar membrul din dreapta este negativ, ecuatia nu are solutii.

b) Utilizand [afirmatia 1](http://www.math.md/school/rubrica/exp/expe.html" \l "Afirmatia 1) se obtine *x* = log24 , adica *x* = 2.

c) Similar exemplului precedent se obtine *x* = log25.

**Nota.** Din [afirmatia 1](http://www.math.md/school/rubrica/exp/expe.html" \l "Afirmatia 1) rezulta ca ecuatia exponentiala de tipul

|  |  |
| --- | --- |
| *a* *f*(*x*) = *b*, | (2) |

unde *a* > 0, *a*  1 si *b* > 0, este echivalenta cu ecuatia

*f*(*x*) = log*ab*.

**Exemplul 2**. Sa se rezolve ecuatiile

a) http://www.math.md/school/rubrica/exp/expe2x.gif     b) http://www.math.md/school/rubrica/exp/expe3x.gif     c) http://www.math.md/school/rubrica/exp/expe4x.gif.

**Rezolvare.** a) Se tine seama de [nota la afirmatia 1](http://www.math.md/school/rubrica/exp/expe.html#Nota la 1) si se obtine ecuatia trigonometrica

http://www.math.md/school/rubrica/exp/expe5x.gif

Cum http://www.math.md/school/rubrica/exp/expe6x.gif, rezulta http://www.math.md/school/rubrica/exp/expe7x.gif, de unde http://www.math.md/school/rubrica/exp/expe8x.gif

b) Cum log39 = 2, se obtine ecuatia

|*x*2-*x*| = 2.

Utilizand proprietatile modulului (a se vedea, de exemplu, [[1](http://www.math.md/school/rubrica/exp/biblio.html)]) se obtine

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  | | --- | | |*x*2-*x*| = 2 | |  | http://www.math.md/school/rubrica/exp/t1x.gif | *x*2-*x* = 2, |  | http://www.math.md/school/rubrica/exp/t1x.gif | *x*2-*x*-2 = 0, |  | http://www.math.md/school/rubrica/exp/t1x.gif | *x* = -1, |
| *x*2-*x* = -2, | *x*2-*x*+2 = 0, | *x* = 2. |

c) Logaritmand in baza 5 (ambii membri sunt pozitivi) se obtine

http://www.math.md/school/rubrica/exp/expe12x.gif (2+4+6+...+2*x*) = 45 sau 1+2+...+*x* = 45.

Utilizind formula pentru suma primilor *n* termeni ai progresiei aritmetice se obtine

http://www.math.md/school/rubrica/exp/expe13x.gif

de unde rezulta ecuatia patrata

*x*2+*x*-90 = 0

cu solutiile *x*1 = -10 si *x*2 = 9. Cum *x*  **N**, ramane *x* = 9.

La rezolvarea ecuatiilor exponentiale se utilizeaza urmatoarea afirmatie de baza referitoare la echivalenta ecuatiilor (a se vedea, de exemplu, [[2](http://www.math.md/school/rubrica/exp/biblio.html)]).

**Afirmatia 2.**Daca *a* > 0 si *a*  1, atunci ecuatiile

|  |  |
| --- | --- |
| *a**f*(*x*) = *a**g*(*x*) | (3) |

si

*f*(*x*) = *g*(*x*)

sunt echivalente.

**Nota**. Ecuatiile de tipul

*a**f*(*x*) = *bg*(*x*)     (*a* > 0, *a*  1, *b* > 0)

se pot scrie astfel

http://www.math.md/school/rubrica/exp/expe15x.gif

si se rezolva utilizind [afirmatia 2](http://www.math.md/school/rubrica/exp/expe.html" \l "Afirmatia 2).

Unele ecuatii exponentiale se reduc la ecuatiile de tipul ([1](http://www.math.md/school/rubrica/exp/expe.html#(1)))-([3](http://www.math.md/school/rubrica/exp/expe.html#(3))) cu ajutorul egalitatilor:

E1) *ax*· *ay* = *ax*+*y*,   E2) http://www.math.md/school/rubrica/exp/expe16x.gif   E3) (*ax*) *y* = *ax*·*y*,   E4) http://www.math.md/school/rubrica/exp/expe17x.gif   E5) *ax*· *bx* = (*ab*)*x*.

**Exemplul 3**. Sa se rezolve ecuatiile

a) http://www.math.md/school/rubrica/exp/expe18x.gif   b) http://www.math.md/school/rubrica/exp/expe19x.gif   c) http://www.math.md/school/rubrica/exp/expe20x.gif   d) 32*x*-1 = 7*x*+1.

**Rezolvare.** a) Se utilizeaza egalitatile [E1-E3](http://www.math.md/school/rubrica/exp/expe.html#Egalitati), [afirmatia 2](http://www.math.md/school/rubrica/exp/expe.html" \l "Afirmatia 2) si se obtine

http://www.math.md/school/rubrica/exp/expe21x.gif

   32*x*+1+2(*x*+2)-3*x* = 35      2*x*+1+2*x*+4-3*x* = 5      *x* = 0.

b) Cum http://www.math.md/school/rubrica/exp/expe22x.gif   (*ab*  0), rezulta   http://www.math.md/school/rubrica/exp/expe23x.gif si utilizand proprietatile [E4](http://www.math.md/school/rubrica/exp/expe.html#Egalitati),[E3](http://www.math.md/school/rubrica/exp/expe.html" \l "Egalitati) si [E1](http://www.math.md/school/rubrica/exp/expe.html#Egalitati) se obtine

http://www.math.md/school/rubrica/exp/expe24x.gif

de unde, in baza [afirmatiei 2](http://www.math.md/school/rubrica/exp/expe.html" \l "Afirmatia 2), rezulta ecuatia patrata

2*x*2-*x*-15 = 0

cu solutiile *x* = 3 si *x* = -5/2.

c) Cum 43*x*+1 = 41·43*x* = 4·(43)*x* = 4·64*x*,     http://www.math.md/school/rubrica/exp/expe25x.gif ecuatia devine

4·64*x* ·25*x* = 6400

sau

64*x*·25*x* = 1600.

Utilizand proprietatea [E5](http://www.math.md/school/rubrica/exp/expe.html#Egalitati) si [afirmatia 2](http://www.math.md/school/rubrica/exp/expe.html" \l "Afirmatia 2) se obtine 1600*x* = 1600, de unde *x* = 1.

d) Se tine seama de [nota la afirmatia 2](http://www.math.md/school/rubrica/exp/expe.html#Nota 2) si se obtine

http://www.math.md/school/rubrica/exp/expe26x.gif

de unde rezulta ecuatia liniara

2*x*-1 = *x*log37+ log37

sau

*x*(2-log37) = log37+1

cu solutia http://www.math.md/school/rubrica/exp/expe27x.gif

Daca ecuatia exponentiala este de tipul

|  |  |
| --- | --- |
| *F*(*a**f*(*x*)) = 0, | (4) |

atunci prin intermediul substitutiei *t* = *a**f*(*x*), se obtine ecuatia

*F*(*t*) = 0,

care de regula se rezolva mai simplu. In cele mai frecvente cazuri se intalnesc ecuatiile de tipul

|  |  |
| --- | --- |
| *A*·*a*2*f*(*x*) +*B*·*a**f*(*x*) +*C* = 0, | (5) |
| *A*·*a**f*(*x*)+ *C*·*a*-*f*(*x*)+ *B* = 0 |

(*A, B* si *C*  **R**), care cu ajutorul substitutiei *t* = *a**f*(*x*) se reduc la ecuatia patrata

*At*2+*Bt*+*C* = 0.

**Exemplul 4**. Sa se rezolve ecuatiile:

a) 2*x*+3·2*x*-4 = 76,     b) 3-*x*+9· 3*x*+9*x*+1+9-*x*-1=8,     c) http://www.math.md/school/rubrica/exp/expe30x.gif

d) 21+*x*-23-*x* = 15,     e) http://www.math.md/school/rubrica/exp/expe31x.gif

**Rezolvare.** a) 2*x*+3·2*x*-4 = 76      http://www.math.md/school/rubrica/exp/expe32x.gif. Se noteaza *t* = 2*x*, si se obtine ecuatia liniara

16*t*+3*t* = 76·16,

de unde *t* = 64. Asadar 2*x* = 64 si *x* = 6.

b) Ecuatia se scrie

http://www.math.md/school/rubrica/exp/expe33x.gif

Se noteaza *t* = 3*x* (atunci 9*x* = *t*2), si se obtine ecuatia algebrica

http://www.math.md/school/rubrica/exp/expe34x.gif

care se reduce (a se vedea [[1](http://www.math.md/school/rubrica/exp/biblio.html)]) prin substitutia

http://www.math.md/school/rubrica/exp/expe35x.gif

(atunci http://www.math.md/school/rubrica/exp/expe36x.gif) la ecuatia patrata

http://www.math.md/school/rubrica/exp/expe37x.gif

sau

*z*2+9*z*-90 = 0,

de unde *z*1 = -15, *z*2 = 6. Cum *t* > 0, *z*1 = -15 nu verifica ecuatia si ramane

http://www.math.md/school/rubrica/exp/expe38x.gif

de unde

9*t*2-6*t*+1 = 0

cu solutia *t* = 1/3. Asadar 3*x* = 1/3, de unde *x* = -1.

c) Se noteaza http://www.math.md/school/rubrica/exp/expe40x.gif, atunci http://www.math.md/school/rubrica/exp/expe41x.gif si se obtine ecuatia patrata

*t*2-*t*-2 = 0

cu solutiile *t*1 = -1 si *t*2 = 2. Cum *t* > 0 (mai exact, deoarece *x*2  0, http://www.math.md/school/rubrica/exp/expe42x.gif), ramane *t* = 2, adica

http://www.math.md/school/rubrica/exp/expe43x.gif

de unde *x*2 = 1 si deci *x* = 1.

d) Cum 21+*x* = 2·2*x*, http://www.math.md/school/rubrica/exp/expe44x.gif, se noteaza *t* = 2*x* si ecuatia devine

http://www.math.md/school/rubrica/exp/expe45x.gif

Se multiplica ambii membri ai ecuatiei cu *t*  (*t* > 0) si se obtine ecuatia patrata

2*t*2-15*t*-8 = 0

cu solutiile http://www.math.md/school/rubrica/exp/expe46x.gif si *t*2 = 8. Cum *t*1 < 0, ramane

2*x* = 8,

de unde *x* = 3.

e) Se noteaza http://www.math.md/school/rubrica/exp/expe47x.gif (cum http://www.math.md/school/rubrica/exp/expe48x.gif in *x*  (-,0] [2,+), rezulta *t*  1) si se obtine ecuatia

4*t*2-9*t*+2 = 0

cu solutiile *t*1 = 1/4 si *t*2 = 2. Cum *t*1 < 1 ramane de rezolvat ecuatia

http://www.math.md/school/rubrica/exp/expe50x.gif

echivalenta cu

http://www.math.md/school/rubrica/exp/expe51x.gif

Deoarece ambii membri ai ecuatiei sunt pozitivi, ridicand la patrat se obtine ecuatia echivalenta (a se vedea, de exemplu, [[1](http://www.math.md/school/rubrica/exp/biblio.html)])

*x*2-2*x* = 1

cu solutiile http://www.math.md/school/rubrica/exp/expe52x.gif.

Ecuatiile de tipul

*A*·*a*2*f*(*x*) +*B*·*a**f*(*x*) *b**f*(*x*) +*C*·*b*2*f*(*x*) = 0,

(*A*, *B*, *C*  **R**, *A*·*B*·*C*  0) se numesc ecuatii exponentiale omogene. Prin multiplicarea, de exemplu, cu http://www.math.md/school/rubrica/exp/expe53x.gif ele se reduc la ecuatia patrata

*At*2+*Bt*+*C* = 0,

unde http://www.math.md/school/rubrica/exp/expe54x.gif.

**Exemplul 5**. Sa se rezolve ecuatiile

a) 64·9*x* -84·12*x* +27·16*x* = 0,     b) 9·22*x*+2 -45·6*x* -32*x*+4 = 0.

**Rezolvare.** a) Ecuatia se scrie

64·32*x* -84·3*x* ·4*x* +27·42*x* = 0

si impartind la 42*x* se obtine

http://www.math.md/school/rubrica/exp/expe55x.gif

sau

http://www.math.md/school/rubrica/exp/expe56x.gif

Se noteaza http://www.math.md/school/rubrica/exp/expe57x.gif si se obtine ecuatia patrata

64*t*2-84*t*+27 = 0.

Discriminantul ecuatiei date este  = 842 -4·64·27 = 42· 32·72 -4·4·16·9·3 = 42·32(49-48) = 122, iar solutiile

http://www.math.md/school/rubrica/exp/expe58x.gif si http://www.math.md/school/rubrica/exp/expe59x.gif

Asadar



de unde *x*1 = 2 si *x*2 = 1.

b) Ecuatia se scrie

36·22*x* -45·2*x*· 3*x* -81·32*x* = 0

sau (multiplicand cu http://www.math.md/school/rubrica/exp/expe61x.gif)

http://www.math.md/school/rubrica/exp/expe62x.gif

Notand http://www.math.md/school/rubrica/exp/expe63x.gif se obtine ecuatia patrata

4*t*2-5*t*-9 = 0

cu solutiile *t* = -1, *t* = 9/4. Cum *t* > 0 ramane http://www.math.md/school/rubrica/exp/expe64x.gif de unde *x* = -2.

Uneori se intalnesc ecuatii ce se rezolva prin metoda "scoaterii factorului comun in afara parantezei".

**Exemplul 6**. Sa se rezolve ecuatiile

|  |
| --- |
| a) 2*x*+1 - 2*x* + 2*x*-2 - 2*x*-3 = 9, |
| b) 2*x*+1 - 2*x*+2 - 2*x*+3 = 5*x* - 5*x*+1, |
| c) *x*2·2*x*+1 + 2|*x*-3|+2 = *x*2·2|*x*-3|+4 + 2*x*-1. |

**Rezolvare.** a) Ecuatia se scrie

http://www.math.md/school/rubrica/exp/expe65x.gif

sau

http://www.math.md/school/rubrica/exp/expe66x.gif

Efectuand operatiile din paranteze se obtine

http://www.math.md/school/rubrica/exp/expe67x.gif

de unde 2*x* = 8 si *x* = 3.

b) Similar rezolvarii ecuatiei precedente se obtine:

2*x*+1-2*x*+2 -2*x*+3 = 5*x*-5*x*+1     2*x*·2-2*x*·4 -2*x*·8 = 5*x*-5*x*·5  

2*x*(2-4-8) = 5*x*(1-5)     2*x*(-10) = 5*x*(-4)     http://www.math.md/school/rubrica/exp/expe68x.gif   

http://www.math.md/school/rubrica/exp/expe69x.gif

c) Se trec toti termenii in partea stanga a ecuatiei si se grupeaza convenabil

(*x*2·2*x*+1 -2*x*-1)+(2|*x*-3|+2- *x*2·2|*x*-3|+4) = 0.

In fiecare paranteza se scoate factorul comun in afara parantezei

2*x*-1(4*x*2-1) +2|*x*-3|+2(1-4*x*2) = 0,

de unde rezulta

(4*x*2-1)·(2*x*-1 -2|*x*-3|+2) = 0

si totalitatea de ecuatii

|  |  |
| --- | --- |
| http://www.math.md/school/rubrica/exp/t1x.gif | 4*x*2-1 = 0, |
| 2*x*-1 = 2|*x*-3|+2. |

Prima ecuatie are solutiile *x*1 = -1/2,  *x*2 = 1/2, iar a doua se rezolva utilizand proprietatile modulului:

2*x*-1 = 2|*x*-3|+2      *x*-1 = |*x*-3|+2      *x*-3 = |*x*-3|      *x*-3  0     *x*  3.

Asadar, solutiile acestei ecuatii sunt

*x*  { 1/2} [3,+).

Unele ecuatii exponentiale se rezolva prin metode specifice.

**Exemplul 7**. Sa se rezolve ecuatiile

|  |  |  |
| --- | --- | --- |
| a) http://www.math.md/school/rubrica/exp/expe70x.gif | d) 4*x*+(*x*-1)2*x* = 6-2*x*, | g) http://www.math.md/school/rubrica/exp/expe72x.gif |
| b) 5*x*-2 = 8-*x*, | e) *x*2+*x*+2 = 2·2*x*-4*x*, | h) http://www.math.md/school/rubrica/exp/expe73x.gif |
| c) 3*x*+4*x* = 5*x*, | f) http://www.math.md/school/rubrica/exp/expe71x.gif | i) http://www.math.md/school/rubrica/exp/expe74x.gif |

**Rezolvare.** a) Se observa ca http://www.math.md/school/rubrica/exp/expe77x.gif si utilizand substitutia http://www.math.md/school/rubrica/exp/expe78x.gif (atunci http://www.math.md/school/rubrica/exp/expe79x.gif) se obtine ecuatia

http://www.math.md/school/rubrica/exp/expe80x.gif

sau

*t*2-62*t*+1 = 0

cu solutiile http://www.math.md/school/rubrica/exp/expe81x.gif si http://www.math.md/school/rubrica/exp/expe82x.gif. Cum http://www.math.md/school/rubrica/exp/expe83x.gif, se obtine totalitatea de ecuatii

http://www.math.md/school/rubrica/exp/expe84x.gif

de unde *x*1 = 2 si *x*2 = -2   ( se tine seama ca http://www.math.md/school/rubrica/exp/expe85x.gif ).

b) Se observa ca *x* = 3 este solutie a ecuatiei date. Alte solutii ecuatia data nu are, deoarece membrul din stanga reprezinta o functie crescatoare, iar membrul din dreapta o functie descrescatoare, si cum graficele acestor functii pot avea cel mult un punct comun, rezulta ca *x* = 3 este unica solutie.

c) Se observa ca *x* = 2 este solutie a acestei ecuatii. Alte solutii ecuatia nu are. In adevar, ecuatia se scrie

http://www.math.md/school/rubrica/exp/expe86x.gif

Se observa ca functia http://www.math.md/school/rubrica/exp/expe87x.gif ca suma a doua functii descrescatoare este la fel descrescatoare si, prin urmare, capata fiecare valoare a sa doar o singura data.

d) Se noteaza *t* = 2*x* si se rezolva ecuatia patrata in *t*:

*t*2+(*x*-1)*t*+2*x*-6 = 0.

Discriminantul acestei ecuatii este  = (*x*-1)2-4(2*x*-6) = *x*2-10*x*+25 = (*x*-5)2, iar soluiile

http://www.math.md/school/rubrica/exp/expe88x.gif   http://www.math.md/school/rubrica/exp/expe89x.gif

Cum solutia *t* = -2 nu verifica conditia *t* > 0, ramane

2*x* = 3-*x*

Se rezolva similar exemplului [b)](http://www.math.md/school/rubrica/exp/expe.html#Exemplul 7.b) si se obtine *x* = 1.

e) Ecuatia se scrie

*x*2+*x*+1 = 2·2*x*-4*x*-1

sau

*x*2+*x*+1 = -(2*x*-1)2,

de unde rezulta, ca ecuatia nu are solutii. In adevar, cum http://www.math.md/school/rubrica/exp/expe90x.gif membrul din stanga ecuatiei ia valori in multimea [3/4; +), iar membrul din dreapta ecuatiei valori nepozitive.

f) Se observa ca ecuatia are solutii doar pentru *x* > 0. Atunci membrul din dreapta

http://www.math.md/school/rubrica/exp/expe91x.gif

in plus semnul egalitatii se obtine pentru *x* = 1 (se tine seama de inegalitatea http://www.math.md/school/rubrica/exp/expe92x.gif justa pentru orice *a* > 0), pe cand membrul din stanga ecuatiei primeste valoara maxima 2 pentru *x* = 1. In adevar

http://www.math.md/school/rubrica/exp/expe93x.gif

Astfel unica solutie a acestei ecuatii este *x* = 1.

g) Se observa, ca pentru *x*  (-,-1/2] ecuatia nu are solutii (in adevar, in asa caz membrul din stanga ia valori nepozitive). Pentru *x*  (-1/2;+) membrul din stanga reprezinta o functie strict crescatoare, ca produsul a doua functii strict crescatoare, si, prin urmare, primeste fiecare valoare a sa doar o singura data. Ramane de observat ca *x* = 0 este solutie (unica) a ecuatiei.

h) Domeniul valorilor admisibile al ecuatiei este multimea numerelor naturale, mai mari ca 1. Ecuatia se scrie

http://www.math.md/school/rubrica/exp/expe94x.gif

Se logaritmeaza, de exemplu, in baza 5 si se obtine

http://www.math.md/school/rubrica/exp/expe95x.gif

sau

http://www.math.md/school/rubrica/exp/expe96x.gif

de unde se obtine ecuatia patrata

*x*2+*x*(log52-3)-3log52 = 0

cu solutiile *x*1 = 3 si *x*2 = -log52. Cum *x*2  *DVA*, rezulta ca unica solutie a ecuatiei este *x* = 3.

i) *DVA* a ecuatiei este multimea *x*  **R**\{ 0} si astfel (a se vedea exemplul precedent) solutiile ei sunt numerele 3 si -log52.

Uneori se intalnesc ecuatii ce contin necunoscuta atat in baza cat si in exponentul puterii:

|  |  |
| --- | --- |
| [*h*(*x*)]*f*(*x*) = *b*    ([*h*(*x*)]*f*(*x*) = [*h*(*x*)]*g*(*x*)). | (6) |

De regula, domeniul de definitie pentru functia [*h*(*x*)]*f*(*x*)    ([*h*(*x*)]*g*(*x*)) se considera multimea tuturor valorilor *x*  *D*(*f*) (*x*  *D*(*f*)*D*(*g*) ), unde *D*(*f*) desemneaza domeniul de definitie al functiei *f* (*f* si*g*), pentru care *h*(*x*) > 0. Astfel:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| |  | | --- | | [*h*(*x*)]*f*(*x*) = [*h*(*x*)]*g*(*x*)  | | http://www.math.md/school/rubrica/exp/t1x.gif | http://www.math.md/school/rubrica/exp/t0x.gif | *f*(*x*) = *g*(*x*), |
| *h*(*x*) > 0, |
| *h*(*x*)  1, |
| http://www.math.md/school/rubrica/exp/t0x.gif | *h*(*x*) = 1, |
| *x*  *D*(*f*) *D*(*g*). |

**Exemplul 8**. Sa se rezolve ecuatiile :

a) http://www.math.md/school/rubrica/exp/expe100x.gif http://www.math.md/school/rubrica/exp/expe101x.gif    b) http://www.math.md/school/rubrica/exp/expe102x.gif,    c) http://www.math.md/school/rubrica/exp/expe103x.gif

**Rezolvare.** a) Cum *a*2 = |*a*|2 ecuatia se scrie astfel

http://www.math.md/school/rubrica/exp/expe100x.gif http://www.math.md/school/rubrica/exp/expe104x.gif

si este echivalenta cu totalitatea de sisteme

|  |  |  |
| --- | --- | --- |
| http://www.math.md/school/rubrica/exp/t1x.gif | http://www.math.md/school/rubrica/exp/t0x.gif | |*x*-2| > 0, |
| |*x*-2| 1, |
| *x*2+*x*+1 = 2, |
| http://www.math.md/school/rubrica/exp/t0x.gif | |*x*-2| = 1, |
| *x*  *DVA*. |

de unde se obtin solutiile: *x* = -2, *x* = 3 si *x* = 1.

b) Se scrie (*x*2+*x*)0 = 1, si se obtine

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  | | --- | | http://www.math.md/school/rubrica/exp/expe102x.gif  http://www.math.md/school/rubrica/exp/expe106x.gif  | | |  |  |  |  | | --- | --- | --- | --- | | http://www.math.md/school/rubrica/exp/t1x.gif | http://www.math.md/school/rubrica/exp/t0x.gif | *x*2+*x* > 0, |  | | *x*2+*x*  1, | | *x*2+2*x* = 0, | |  | *x*2+*x* = 1, | | |  |  | | --- | --- | | http://www.math.md/school/rubrica/exp/t1x.gif | *x* = -2, | | http://www.math.md/school/rubrica/exp/expe109x.gif | | http://www.math.md/school/rubrica/exp/expe110x.gif | |

c) *DVA* al ecuatiei este multimea (0;+). In *DVA* ecuatia este echivalenta cu totalitatea

|  |  |  |
| --- | --- | --- |
| http://www.math.md/school/rubrica/exp/t1x.gif | http://www.math.md/school/rubrica/exp/t0x.gif | |*x*-1| > 0, |
| |*x*-1|  1, |
| lg2*x*-lg*x*2 = 3. |
| http://www.math.md/school/rubrica/exp/t0x.gif | |*x*-1| = 1, |
| *x* > 0. |

de unde rezulta solutiile *x* = 1/10, *x* = 1000 si *x* = 2.

**Nota**. Uneori este necesar ca functiile din ([6](http://www.math.md/school/rubrica/exp/expe.html#(6))) sa fie examinate pe domenii mai largi: se tine seama ca functia *h*(*x*)*f*(*x*) are sens si atunci cand *h*(*x*) = 0 si *f*(*x*) > 0   (*g*(*x*) > 0) sau *h*(*x*) < 0 si *f*(*x*)  (*g*(*x*)) ia valori in multmea numerelor intregi etc. (a se vedea [[2](http://www.math.md/school/rubrica/exp/biblio.html)]-[[4](http://www.math.md/school/rubrica/exp/biblio.html)]).