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## Zestaw 7

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### 2N

Metoda Brenta znaleźć minimum funkcji CS znalezionej w zadaniu 1N.

In[1]:= CS[x\_] :=  
- 0.156252122524907` + 0.5953030263542618` x - 1.7285531226262874` x<sup>2</sup> + 0.915400459845337` x<sup>3</sup>

```

In[2]:= MetodaBrenta[xp_, xk_] := Module[{},
  SzMin[f_, a0_, c0_, b0_, τ_, max_] :=
  Module[{a = N[a0], b = N[b0], c = N[c0], k, fa, fb, fc, fs, s, temp},
    bis[funckja_, a00_, b00_, c00_, d00_] := Module[{ffd = N[funckja[d00]],
      aa = N[a00], bb = N[b00], cc = N[c00], dd = N[d00], ffb = N[funckja[b00]]},
      If[ffd < ffb,
        If[dd < bb, cc = bb; bb = dd; , If[dd > bb, aa = bb; bb = dd;];],
      If[ffd > ffb,
        If[dd < bb, aa = dd; , If[dd > bb, cc = dd;];];];
    ];
  Return[{aa, bb, c}];
];
k = 0;
fa = CS[a];
fb = CS[b];
While[And[Abs[b - a] > τ, k < max],
  fc = CS[c];
  If[And[fa ≠ fc, fb ≠ fc],
    
$$s = - \frac{1}{2} * \frac{a^2 (fc - fb) + b^2 (fa - fc) + c^2 (fb - fa)}{a (fc - fb) + b (fa - fc) + c (fb - fa)};$$

    {a, c, b} = bis[CS, a, c, b, s];,
    
$$s = \frac{a + b}{2};$$

    {a, c, b} = bis[CS, a, c, b, s];];
  fs = CS[s];
  If[c > s, temp = s; s = c; c = temp;];
  If[fc fs < 0,
    a = s; b = c; ,
    If[fs fb < 0, a = c, b = s;];];
  k = k + 1;]; Return[s];
petla = True;
For[i = 1, i ≤ 100, i++,
  a = RandomReal[{xp, xk}];
  b = RandomReal[{a + 10-8, xk}];
  c = RandomReal[{b + 10-8, xk}];
  If[And[(CS[a] > CS[b]), (CS[c] > CS[b]), (a < b < c)],
    minimum = SzMin[CS, a, b, c, 10-8, 20];
    If[petla == True,
      xpo = a; xps = b; xko = c;
      xm = minimum;
      petla == False; ,
      If[CS[minimum] < CS[xm],
        xpo = a; xps = b; xko = c; xm = minimum;
      ];];
  xpo = a; xps = b; xko = c;
  xm = minimum;];];
Print["Punkty \n", "x1=", xpo, " x2=", xps,
  "\n x3=", xko, "\n x minmum=", xm, "\n y minimum=", CS[xm];];

```

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In[3]:= MetodaBrenta[-1.5, 1.5]
```

Punkty

```
x1=0.213095 x2=1.3439 x3=1.43455
```

```
x minmum=0.635927
```

```
y minimum=-0.241301
```

```
In[4]:= MetodaBrenta[-1, 1.5]
```

Punkty

```
x1=0.742578 x2=1.1747 x3=1.40763
```

```
x minmum=0.925236
```

```
y minimum=-0.360153
```

```
In[5]:= MetodaBrenta[0, 1.5]
```

Punkty

```
x1=0.807705 x2=1.19714 x3=1.26306
```

```
x minmum=0.957563
```

```
y minimum=-0.367433
```