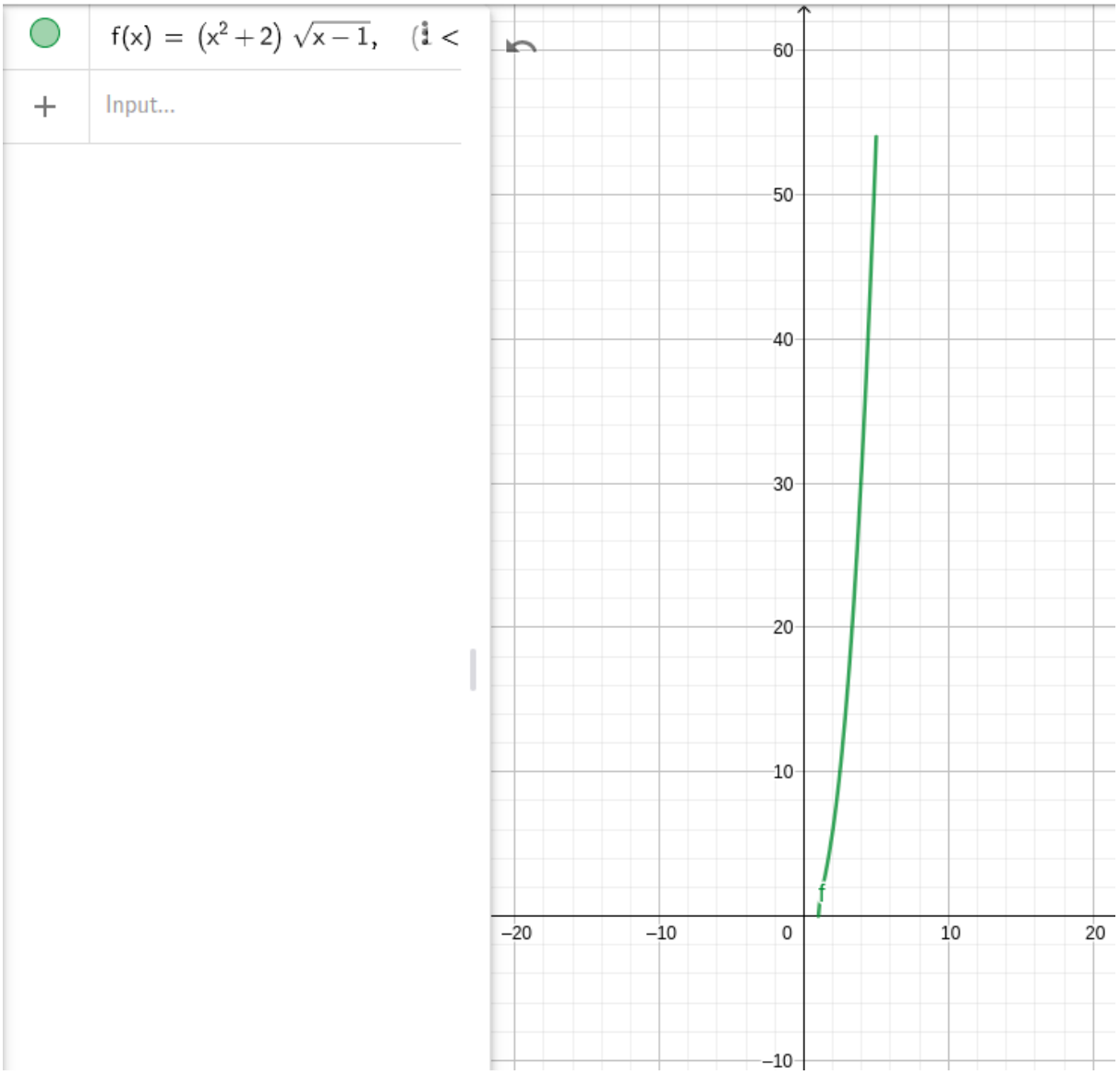
Інтерполяційний поліном Лагранжа

Кріпака Ілля

Варіант 5

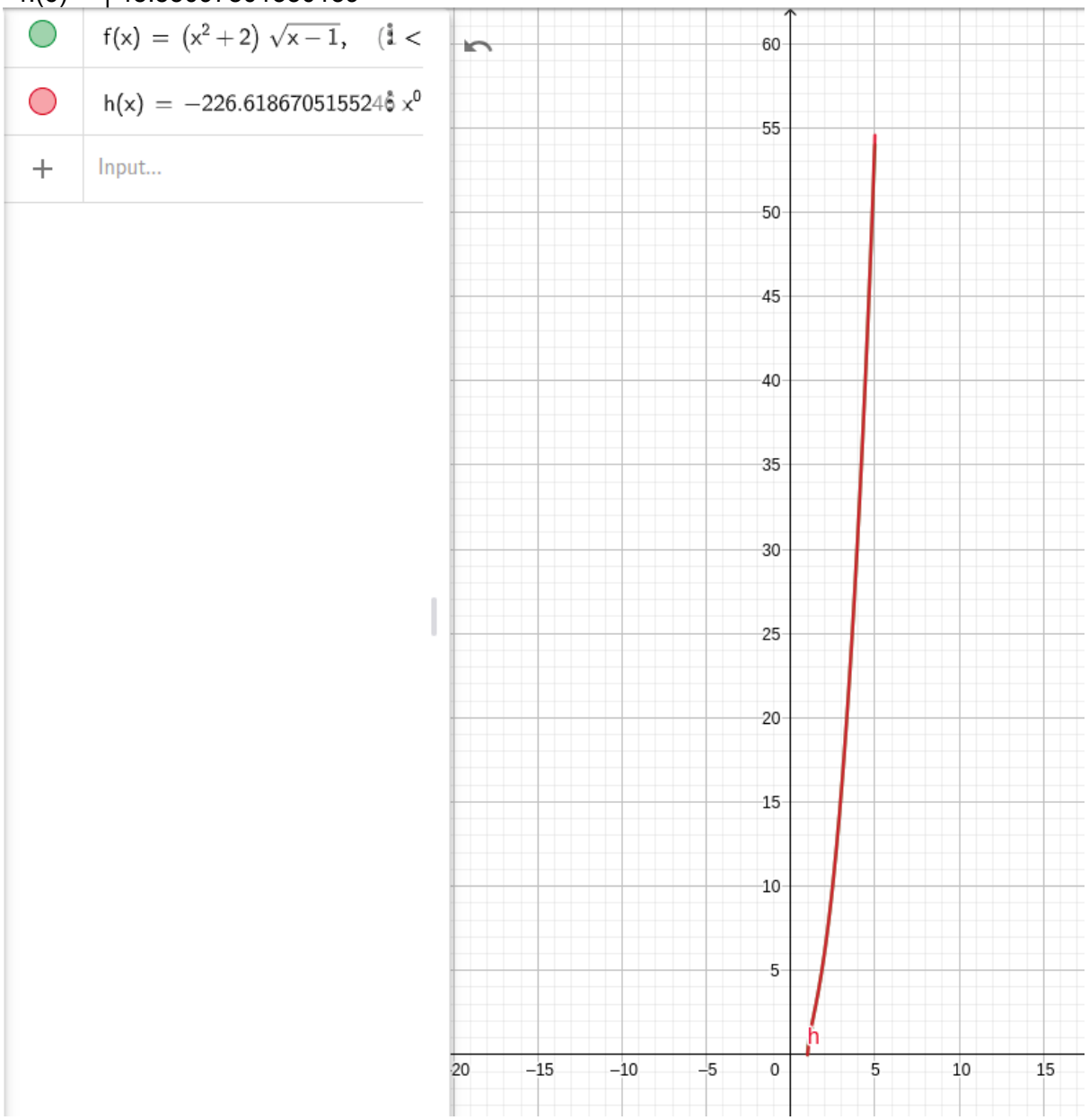
| | | |
|---|---|---|
| 5 | $(x^2+2)\sqrt{x-1}$ | [1,5] |

If(1<x<5, (x^(2)+1) sqrt(x-1)) (для geogebra.org)



g(x)=-226.61867051552463x^0 + 941.2358886468646x^1 + -1759.5612435512885x^2 + 1952.3609236746343x^3 + -1423.7891693864294x^4 + 716.9414505307068x^5 + -254.3351903367602x^6 + 63.57889344549494x^7 + -10.979206646298167x^8 + 1.247818389113732x^9 + -0.0840358470389031x^10 + 0.002541594400659153x^11 (інтерпольований поліном для 12 значень)
Крок 0.(3)

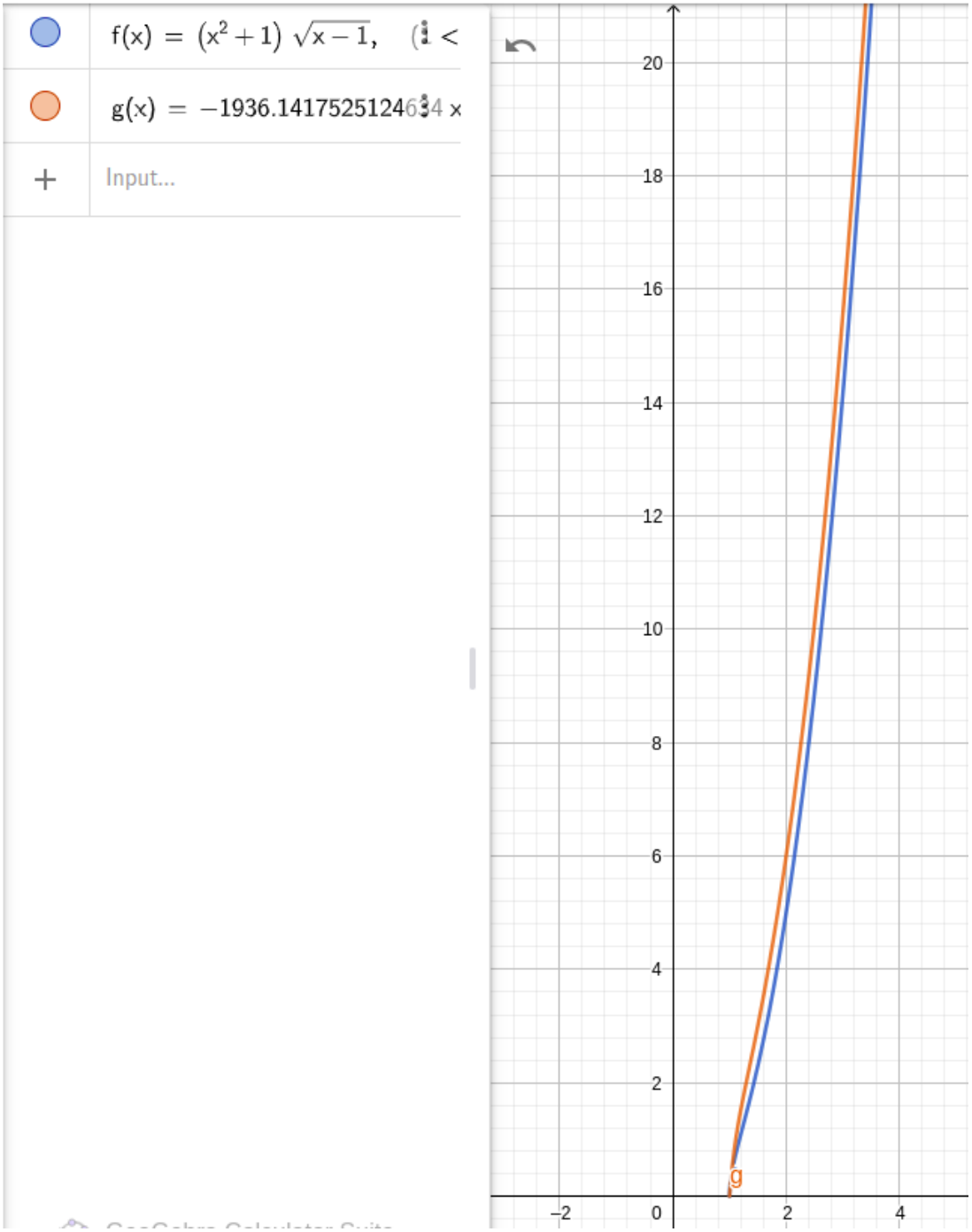
| x | y |
|---|---|
| 1 | 0 |
| 1.(3) | 2.181101016938586 |
| 1.(6) | 3.901039219988023 |
| 2 | 6 |
| 2.(3) | 8.596104007934425 |
| 2.(6) | 11.762393866259567 |
| 3 | 15.556349186104047 |
| 3.(3) | 20.027553037214414 |
| 3.(6) | 25.220672166434202 |
| 4 | 31.17691453623979 |
| 4.(3) | 37.93485861239485 |
| 4.(6) | 45.53097801330139 |



| **x** | **y** (16 значень) |
|---|---|
| 1 | 0 |
| 1.25 | 1.78125 |
| 1.5 | 3.0052038200428273 |
| 1.75 | 4.384253606658721 |
| 2 | 6 |
| 2.25 | 7.896115045546133 |
| 2.5 | 10.104145188980608 |
| 2.75 | 12.649998456027575 |
| 3 | 15.556349186104047 |
| 3.25 | 18.84375 |
| 3.5 | 22.531228328699704 |
| 3.75 | 26.636642847541804 |
| 4 | 31.17691453623979 |
| 4.25 | 36.16818623199814 |
| 4.5 | 41.6259384278601 |
| 4.75 | 47.56507672060984 |

**Інтерполяція лагранжа для 16 точок:**

Lagrange:  = -1936.1417525124634x^0 + 11220.886683345248x^1 + -30025.097963783657x^2 + 49173.61228057789x^3 + -55106.49919826607x^4 + 44765.07435945817x^5 + -27235.39498820016x^6 + 12640.059909713804x^7 + -4512.851541419281x^8 + 1239.7977097702533x^9 + -260.01743910869845x^10 + 40.89314067869918x^11 + -4.66963907874208x^12 + 0.36560330553512443x^13 + -0.017553543638492375x^14 + 0.0003897054652171744x^15



**Сплайн інтерполяція:**
(поліноми одразу у вигляді, щоб вставити у geogebra.ord)

if[1< x <1.25, 0 + 7.753081992474742(x - 1)^1 + 0(x - 1)^2 + -10.04931187959587(x - 1)^3]
if[1.25< x <1.5, 1.78125 + 5.868836015050516(x - 1.25)^1 + -7.536983909696902(x - 1.25)^2 + 14.579603880720292(x - 1.25)^3]
if[1.5< x <1.75, 3.0052038200428273 + 4.83401978783712(x - 1.5)^1 + 3.397719000843317(x - 1.5)^2 + -2.6760062653500043(x - 1.5)^3]
if[1.75< x <2, 4.384253606658721 + 6.031128113505653(x - 1.75)^1 + 1.3907143018308137(x - 1.75)^2 + 1.3468621504281735(x - 1.75)^3]
if[2< x <2.25, 6 + 6.979021917626342(x - 2)^1 + 2.4008609146519437(x - 2)^2 + 0.0835685743232677(x - 2)^3]
if[2.25< x <2.5, 7.896115045546133 + 8.195121482637926(x - 2.25)^1 + 2.4635373453943945(x - 2.25)^2 + 0.33783607602198745(x - 2.25)^3]
if[2.5< x <2.75, 10.104145188980608 + 9.490234419589246(x - 2.5)^1 + 2.716914402410885(x - 2.5)^2 + 0.2232007679343949(x - 2.5)^3]
if[2.75< x <3, 12.649998456027575 + 10.890541764782387(x - 2.75)^1 + 2.8843149783616813(x - 2.75)^2 + 0.22051857492926588(x - 2.75)^3]
if[3< x <3.25, 15.556349186104047 + 12.374046486762467(x - 3)^1 + 3.0497039095586307(x - 3)^2 + 0.21009266290702064(x - 3)^3]
if[3.25< x <3.5, 18.84375 + 13.938290815836847(x - 3.25)^1 + 3.207273406738896(x - 3.25)^2 + 0.15686635643592695(x - 3.25)^3]
if[3.5< x <3.75, 22.531228328699704 + 15.571339961038033(x - 3.5)^1 + 3.3249231740658414(x - 3.5)^2 + 0.30539713302248944(x - 3.5)^3]
if[3.75< x <4, 26.636642847541804 + 17.29106351051267(x - 3.75)^1 + 3.5539710238327085(x - 3.75)^2 + -0.2955121868625448(x - 3.75)^3]
if[4< x <4.25, 31.17691453623979 + 19.012640487392297(x - 4)^1 + 3.3323368836858(x - 4)^2 + 1.909793195514658(x - 4)^3]
if[4.25< x <4.5, 36.16818623199814 + 21.036895153394195(x - 4.25)^1 + 4.764681780321793(x - 4.25)^2 + -6.352909040429058(x - 4.25)^3]
if[4.5< x <4.75, 41.6259384278601 + 21.831008783447828(x - 4.5)^1 + 0(x - 4.5)^2 + -0(x - 4.5)^3]

$f(x) = (x^2 + 1)\sqrt{x - 1}, \quad (1 <$

$h(x) = 0 + 7.753081992474 (x$

$g(x) = 1.78125 + 5.868836 150$

$p(x) = 3.0052038200428 + 4.83$

$q(x) = 4.3842536066587 + 6.03$

$r(x) = 6 + 6.9790219176263 (x$

$s(x) = 7.8961150455461 + 8.19$

$t(x) = 10.1041451889806 + 9.4$

$f_1(x) = 12.6499984560276 + 10$

$g_1(x) = 15.556349186104 + 12.$

$h_1(x) = 18.84375 + 13.938290 8$

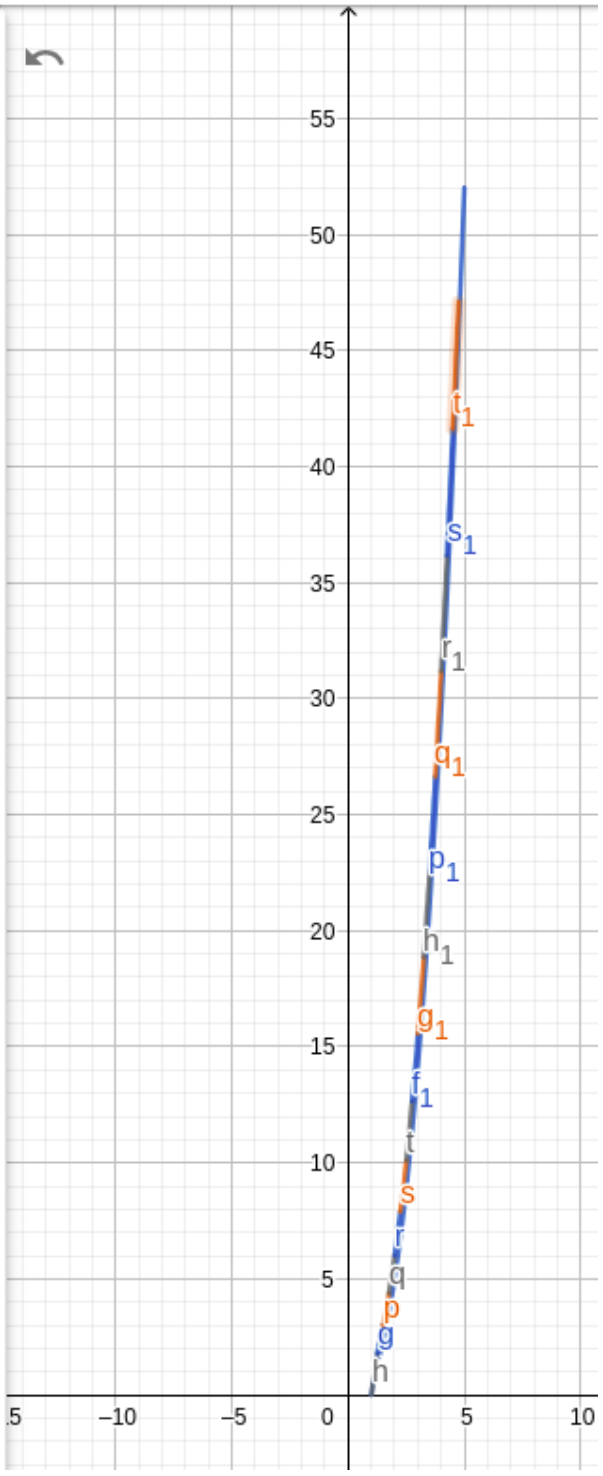
$p_1(x) = 22.5312283286997 + 15$

$q_1(x) = 26.6366428475418 + 17$

$r_1(x) = 31.1769145362398 + 19$

$s_1(x) = 36.1681862319981 + 21$

$t_1(x) = 41.6259384278601 + 21$




h1
18
g1
16
14
f1
12
t
10
s
8
r
6
q
4
p
2
g
h
-2
0
2
4
6
8
10

Похибка:

| x | y_original | y_custom | \|deviation\| |
|---|---|---|---|
| 1.0625 | 0.7822265625 | 0.4821141792465669 | 0.3001123832534331 |
| 1.125 | 1.1545727911561596 | 0.9495076867945071 | 0.20506510436165248 |
| 1.1875 | 1.4766409716871385 | 1.3874598509451939 | 0.08918112074194462 |
| 1.25 | 1.78125 | 1.78125 | 0 |
| 1.3125 | 2.081028107966113 | 2.1221703811470953 | 0.041142273180982514 |
| 1.375 | 2.3825115076289505 | 2.425564917121832 | 0.04305340949288139 |
| 1.4375 | 2.6896749168146865 | 2.71279044954636 | 0.02311553273167366 |
| 1.5 | 3.0052038200428273 | 3.0052038200428273 | 0 |
| 1.5625 | 3.3310546875 | 3.319949074787565 | 0.011105612712435153 |
| 1.625 | 3.6687361916797214 | 3.6573190781736327 | 0.01141711350608876 |
| 1.6875 | 4.019464223467823 | 4.01339389914827 | 0.006070324319552789 |
| 1.75 | 4.384253606658721 | 4.384253606658721 | 0 |
| 1.8125 | 4.763975464553494 | 4.766960415261545 | 0.0029849507080514925 |
| 1.875 | 5.159394755981255 | 5.162505121950589 | 0.0031103659693334507 |
| 1.9375 | 5.571195770472193 | 5.572860669329018 | 0.0016648988568253031 |
| 2 | 6 | 6 | 0 |
| 2.0625 | 6.446379010365112 | 6.445587635283471 | 0.0007913750816408438 |
| 2.125 | 6.910863931752897 | 6.910054411366454 | 0.0008095203864426637 |
| 2.1875 | 7.393952602470851 | 7.393522743152743 | 0.0004298593181077947 6 |
| 2.25 | 7.896115045546133 | 7.896115045546133 | 0 |
| 2.3125 | 8.417797736535093 | 8.418015810477199 | 0.0002180739421060451 4 |
| 2.375 | 8.959426978725222 | 8.95965783798364 | 0.0002308592584174817 8 |
| 2.4375 | 9.521411608295661 | 9.521536005129951 | 0.0001243968342894419 3 |
| 2.5 | 10.104145188980608 | 10.104145188980608 | 0 |
| 2.5625 | 10.7080078125 | 10.707952279464338 | 0.0000553303566152579 |
| 2.625 | 11.333367590758963 | 11.333312217966805 | 0.0000553727921577262 8 |
| 2.6875 | 11.980581904306991 | 11.980551958737916 | 0.0000299455690750960 46 |
| 2.75 | 12.649998456027575 | 12.649998456027575 | 0 |
| 2.8125 | 13.341956167676011 | 13.341978009253406 | 0.0000218415773947100 43 |
| 2.875 | 14.056785948472427 | 14.056814298503932 | 0.0000283500315045870 37 |
| 2.9375 | 14.79481135865282 | 14.794830349035399 | 0.0000189903825784654 15 |
| 3 | 15.556349186104047 | 15.556349186104047 | 0 |
| 3.0625 | 16.34170995055203 | 16.341691289577444 | 0.0000186609745860266 7 |
| 3.125 | 17.15119834694731 | 17.15116695776845 | 0.0000313891788614739 65 |
| 3.1875 | 17.98511363748936 | 17.985083943601243 | 0.0000296938881163555 38 |
| 3.25 | 18.84375 | 18.84375 | 0 |
| 3.3125 | 19.727396838984752 | 19.72745988518518 | 0.0000630462004274079 4 |
| 3.375 | 20.63633906462661 | 20.636456378562315 | 0.0001173139357035779 5 |
| 3.4375 | 21.57085734407728 | 21.57096926483322 | 0.0001119207559412416 2 |
| 3.5 | 22.531228328699704 | 22.531228328699708 | 0.0000000000000035527136788005 01 |
| 3.5625 | 23.51772486033686 | 23.517499617260203 | 0.0002252430766560564 7 |
| 3.625 | 24.530616159207877 | 24.530194227199672 | 0.0004219320082050615 |
| 3.6875 | 25.570167995642468 | 25.569759517599675 | 0.0004084780427930923 |
| 3.75 | 26.636642847541804 | 26.636642847541804 | 0 |
| 3.8125 | 27.73030004518538 | 27.7311448697307 | 0.0008448245453180903 |
| 3.875 | 28.851395904778972 | 28.852979411363307 | 0.0015835065843354812 |
| 3.9375 | 30.000183851950272 | 30.001713593259662 | 0.001529741309390431 |
| 4 | 31.17691453623979 | 31.17691453623979 | 0 |
| 4.0625 | 32.3818359375 | 32.37868776575808 | 0.0031481717419197253 |
| 4.125 | 33.615193465001106 | 33.60929242580641 | 0.005901039194696978 |
| 4.1875 | 34.87723004994414 | 34.87152606501101 | 0.005703984933127515 |
| 4.25 | 36.16818623199814 | 36.16818623199814 | 0 |
| 4.3125 | 37.48830024040642 | 37.50005321410596 | 0.011752973699543645 |
| 4.375 | 38.83780807014422 | 38.85983825352036 | 0.022030183376138268 |
| 4.4375 | 40.21694355355685 | 40.23823533113913 | 0.021291777582277405 |
| 4.5 | 41.6259384278601 | 41.6259384278601 | 0 |
| 4.5625 | 43.06502239884419 | 42.99037647682559 | 0.07464592201860398 |
| 4.625 | 44.534423201086994 | 44.35481452579108 | 0.17960867529591695 |
| 4.6875 | 46.03436665495083 | 45.71925257475657 | 0.3151140801942631 |
| 4.75 | 47.56507672060984 | 47.083690623722056 | 0.4813860968877819 |