

> *# Set the parameters and functions*

$a := 'a':$

$b := 'b':$

$u := 'u':$

$$J := (-20 - 5b)u^6 + (-120b + 10a^3 + 10a^2)u^5 + (-91b^3 + 12a^4 + 15a^5 - 300b^2)u^4 + (6a^6 - 400b^3 + 20a^5 - 292b^4)u^3 + (15a^7 + 28a^6 - 300b^4 - 251b^5)u^2 + (10a^7 - 70b^6 - 120b^5)u - 5b^7 - 20b^6 :$$

print(Output) :

For 'i' = 0, 1,..., 9 i.e. $4.106 \leq a \leq 4.108$

print('i' = 0, 1 ... 9) :

for i from 0 by 1 to 9 do

$u := \frac{57}{10} :$

$a := \frac{4106}{1000} + \frac{2 \cdot (i + 1)}{10000} :$

$b := \frac{4106}{1000} + \frac{2 \cdot i}{10000} :$

print($[[a'[i], a'[i + 1], J'(\delta_a, a'[i + 1], a'[i])]] = [evalf(b, 5), evalf(a, 5), evalf(J)]$);

end do:

For 'i' = 10, 11,..., 25 i.e. $4.108 \leq a \leq 4.124$

print('i' = 10, 11 ... 25) :

for i from 10 by 1 to 25 do

$u := \frac{55}{10} :$

$a := \frac{4108}{1000} + \frac{i - 9}{1000} :$

$b := \frac{4108}{1000} + \frac{i - 10}{1000} :$

print($[[a'[i], a'[i + 1], J'(\delta_a, a'[i + 1], a'[i])]] = [evalf(b, 5), evalf(a, 5), evalf(J)]$);

end do:

For 'i' = 26, 27,..., 71 i.e. $4.124 \leq a \leq 4.17$

print('i' = 26, 27 ... 71);

for i from 26 by 1 to 71 do

$$u := \frac{51}{10} :$$

$$a := \frac{4124}{1000} + \frac{i - 25}{1000} :$$

$$b := \frac{4124}{1000} + \frac{i - 26}{1000} :$$

print(['a'[i], 'a'[i + 1], J'(δ_a, 'a'[i + 1], 'a'[i])] = [*evalf*(b, 5), *evalf*(a, 5), *evalf*(J)]);

end do:

Output

i = 0, 1 ..9

$$[a_0, a_1, J(\delta_a, a_1, a_0)] = [4.1060, 4.1062, -43971.72188]$$

$$[a_1, a_2, J(\delta_a, a_2, a_1)] = [4.1062, 4.1064, -39610.51530]$$

$$[a_2, a_3, J(\delta_a, a_3, a_2)] = [4.1064, 4.1066, -35247.65426]$$

$$[a_3, a_4, J(\delta_a, a_4, a_3)] = [4.1066, 4.1068, -30883.13836]$$

$$[a_4, a_5, J(\delta_a, a_5, a_4)] = [4.1068, 4.1070, -26516.96719]$$

$$[a_5, a_6, J(\delta_a, a_6, a_5)] = [4.1070, 4.1072, -22149.14035]$$

$$[a_6, a_7, J(\delta_a, a_7, a_6)] = [4.1072, 4.1074, -17779.65743]$$

$$[a_7, a_8, J(\delta_a, a_8, a_7)] = [4.1074, 4.1076, -13408.51803]$$

$$[a_8, a_9, J(\delta_a, a_9, a_8)] = [4.1076, 4.1078, -9035.721742]$$

$$[a_9, a_{10}, J(\delta_a, a_{10}, a_9)] = [4.1078, 4.1080, -4661.268160]$$

i = 10, 11 ..25

$$[a_{10}, a_{11}, J(\delta_a, a_{11}, a_{10})] = [4.1080, 4.1090, -3.527880459 \cdot 10^5]$$

$$[a_{11}, a_{12}, J(\delta_a, a_{12}, a_{11})] = [4.1090, 4.1100, -3.336775255 \cdot 10^5]$$

$$[a_{12}, a_{13}, J(\delta_a, a_{13}, a_{12})] = [4.1100, 4.1110, -3.145299881 \cdot 10^5]$$

$$[a_{13}, a_{14}, J(\delta_a, a_{14}, a_{13})] = [4.1110, 4.1120, -2.953453878 \cdot 10^5]$$

$$[a_{14}, a_{15}, J(\delta_a, a_{15}, a_{14})] = [4.1120, 4.1130, -2.761236786 \cdot 10^5]$$

$$[a_{15}, a_{16}, J(\delta_a, a_{16}, a_{15})] = [4.1130, 4.1140, -2.568648145 \cdot 10^5]$$

$$[a_{16}, a_{17}, J(\delta_a, a_{17}, a_{16})] = [4.1140, 4.1150, -2.375687494 \cdot 10^5]$$

$$[a_{17}, a_{18}, J(\delta_a, a_{18}, a_{17})] = [4.1150, 4.1160, -2.182354372 \cdot 10^5]$$

$$[a_{18}, a_{19}, J(\delta_a, a_{19}, a_{18})] = [4.1160, 4.1170, -1.988648318 \cdot 10^5]$$

$$[a_{19}, a_{20}, J(\delta_a, a_{20}, a_{19})] = [4.1170, 4.1180, -1.794568870 \cdot 10^5]$$

$$[a_{20}, a_{21}, J(\delta_a, a_{21}, a_{20})] = [4.1180, 4.1190, -1.600115566 \cdot 10^5]$$

$$[a_{21}, a_{22}, J(\delta_a, a_{22}, a_{21})] = [4.1190, 4.1200, -1.405287943 \cdot 10^5]$$

$$\left[a_{22}, a_{23}, J\left(\delta_a, a_{23}, a_{22} \right) \right] = \left[4.1200, 4.1210, -1.210085538 \cdot 10^5 \right]$$

$$\left[a_{23}, a_{24}, J\left(\delta_a, a_{24}, a_{23} \right) \right] = \left[4.1210, 4.1220, -1.014507888 \cdot 10^5 \right]$$

$$\left[a_{24}, a_{25}, J\left(\delta_a, a_{25}, a_{24} \right) \right] = \left[4.1220, 4.1230, -81855.45292 \right]$$

$$\left[a_{25}, a_{26}, J\left(\delta_a, a_{26}, a_{25} \right) \right] = \left[4.1230, 4.1240, -62222.49963 \right]$$

$i = 26, 27 \dots 71$

$$\left[a_{26}, a_{27}, J\left(\delta_a, a_{27}, a_{26} \right) \right] = \left[4.1240, 4.1250, -7.265517990 \cdot 10^5 \right]$$

$$\left[a_{27}, a_{28}, J\left(\delta_a, a_{28}, a_{27} \right) \right] = \left[4.1250, 4.1260, -7.118229199 \cdot 10^5 \right]$$

$$\left[a_{28}, a_{29}, J\left(\delta_a, a_{29}, a_{28} \right) \right] = \left[4.1260, 4.1270, -6.970643634 \cdot 10^5 \right]$$

$$\left[a_{29}, a_{30}, J\left(\delta_a, a_{30}, a_{29} \right) \right] = \left[4.1270, 4.1280, -6.822760918 \cdot 10^5 \right]$$

$$\left[a_{30}, a_{31}, J\left(\delta_a, a_{31}, a_{30} \right) \right] = \left[4.1280, 4.1290, -6.674580674 \cdot 10^5 \right]$$

$$\left[a_{31}, a_{32}, J\left(\delta_a, a_{32}, a_{31} \right) \right] = \left[4.1290, 4.1300, -6.526102523 \cdot 10^5 \right]$$

$$\left[a_{32}, a_{33}, J\left(\delta_a, a_{33}, a_{32} \right) \right] = \left[4.1300, 4.1310, -6.377326087 \cdot 10^5 \right]$$

$$\left[a_{33}, a_{34}, J\left(\delta_a, a_{34}, a_{33} \right) \right] = \left[4.1310, 4.1320, -6.228250988 \cdot 10^5 \right]$$

$$\left[a_{34}, a_{35}, J\left(\delta_a, a_{35}, a_{34} \right) \right] = \left[4.1320, 4.1330, -6.078876845 \cdot 10^5 \right]$$

$$\left[a_{35}, a_{36}, J\left(\delta_a, a_{36}, a_{35} \right) \right] = \left[4.1330, 4.1340, -5.929203281 \cdot 10^5 \right]$$

$$\left[a_{36}, a_{37}, J\left(\delta_a, a_{37}, a_{36} \right) \right] = \left[4.1340, 4.1350, -5.779229914 \cdot 10^5 \right]$$

$$\left[a_{37}, a_{38}, J\left(\delta_a, a_{38}, a_{37} \right) \right] = \left[4.1350, 4.1360, -5.628956366 \cdot 10^5 \right]$$

$$\left[a_{38}, a_{39}, J\left(\delta_a, a_{39}, a_{38} \right) \right] = \left[4.1360, 4.1370, -5.478382254 \cdot 10^5 \right]$$

$$\left[a_{39}, a_{40}, J\left(\delta_a, a_{40}, a_{39} \right) \right] = \left[4.1370, 4.1380, -5.327507199 \cdot 10^5 \right]$$

$$\left[a_{40}, a_{41}, J\left(\delta_a, a_{41}, a_{40} \right) \right] = \left[4.1380, 4.1390, -5.176330820 \cdot 10^5 \right]$$

$$\left[a_{41}, a_{42}, J\left(\delta_a, a_{42}, a_{41} \right) \right] = \left[4.1390, 4.1400, -5.024852734 \cdot 10^5 \right]$$

$$\left[a_{42}, a_{43}, J\left(\delta_a, a_{43}, a_{42} \right) \right] = \left[4.1400, 4.1410, -4.873072561 \cdot 10^5 \right]$$

$$\left[a_{43}, a_{44}, J\left(\delta_a, a_{44}, a_{43} \right) \right] = \left[4.1410, 4.1420, -4.720989917 \cdot 10^5 \right]$$

$$\left[a_{44}, a_{45}, J\left(\delta_a, a_{45}, a_{44} \right) \right] = \left[4.1420, 4.1430, -4.568604420 \cdot 10^5 \right]$$

$$\left[a_{45}, a_{46}, J\left(\delta_a, a_{46}, a_{45} \right) \right] = \left[4.1430, 4.1440, -4.415915688 \cdot 10^5 \right]$$

$$\left[a_{46}, a_{47}, J\left(\delta_a, a_{47}, a_{46} \right) \right] = \left[4.1440, 4.1450, -4.262923337 \cdot 10^5 \right]$$

$$\left[a_{47}, a_{48}, J\left(\delta_a, a_{48}, a_{47} \right) \right] = \left[4.1450, 4.1460, -4.109626982 \cdot 10^5 \right]$$

$$\left[a_{48}, a_{49}, J\left(\delta_a, a_{49}, a_{48} \right) \right] = \left[4.1460, 4.1470, -3.956026242 \cdot 10^5 \right]$$

$$\left[a_{49}, a_{50}, J\left(\delta_a, a_{50}, a_{49} \right) \right] = \left[4.1470, 4.1480, -3.802120730 \cdot 10^5 \right]$$

$$\left[a_{50}, a_{51}, J\left(\delta_a, a_{51}, a_{50} \right) \right] = \left[4.1480, 4.1490, -3.647910063 \cdot 10^5 \right]$$

$$\left[a_{51}, a_{52}, J\left(\delta_a, a_{52}, a_{51} \right) \right] = \left[4.1490, 4.1500, -3.493393855 \cdot 10^5 \right]$$

$$\begin{aligned}
\left[a_{52}, a_{53}, J\left(\delta_a, a_{53}, a_{52}\right) \right] &= \left[4.1500, 4.1510, -3.338571721 \cdot 10^5 \right] \\
\left[a_{53}, a_{54}, J\left(\delta_a, a_{54}, a_{53}\right) \right] &= \left[4.1510, 4.1520, -3.183443275 \cdot 10^5 \right] \\
\left[a_{54}, a_{55}, J\left(\delta_a, a_{55}, a_{54}\right) \right] &= \left[4.1520, 4.1530, -3.028008132 \cdot 10^5 \right] \\
\left[a_{55}, a_{56}, J\left(\delta_a, a_{56}, a_{55}\right) \right] &= \left[4.1530, 4.1540, -2.872265904 \cdot 10^5 \right] \\
\left[a_{56}, a_{57}, J\left(\delta_a, a_{57}, a_{56}\right) \right] &= \left[4.1540, 4.1550, -2.716216205 \cdot 10^5 \right] \\
\left[a_{57}, a_{58}, J\left(\delta_a, a_{58}, a_{57}\right) \right] &= \left[4.1550, 4.1560, -2.559858648 \cdot 10^5 \right] \\
\left[a_{58}, a_{59}, J\left(\delta_a, a_{59}, a_{58}\right) \right] &= \left[4.1560, 4.1570, -2.403192845 \cdot 10^5 \right] \\
\left[a_{59}, a_{60}, J\left(\delta_a, a_{60}, a_{59}\right) \right] &= \left[4.1570, 4.1580, -2.246218409 \cdot 10^5 \right] \\
\left[a_{60}, a_{61}, J\left(\delta_a, a_{61}, a_{60}\right) \right] &= \left[4.1580, 4.1590, -2.088934950 \cdot 10^5 \right] \\
\left[a_{61}, a_{62}, J\left(\delta_a, a_{62}, a_{61}\right) \right] &= \left[4.1590, 4.1600, -1.931342082 \cdot 10^5 \right] \\
\left[a_{62}, a_{63}, J\left(\delta_a, a_{63}, a_{62}\right) \right] &= \left[4.1600, 4.1610, -1.773439414 \cdot 10^5 \right] \\
\left[a_{63}, a_{64}, J\left(\delta_a, a_{64}, a_{63}\right) \right] &= \left[4.1610, 4.1620, -1.615226558 \cdot 10^5 \right] \\
\left[a_{64}, a_{65}, J\left(\delta_a, a_{65}, a_{64}\right) \right] &= \left[4.1620, 4.1630, -1.456703123 \cdot 10^5 \right] \\
\left[a_{65}, a_{66}, J\left(\delta_a, a_{66}, a_{65}\right) \right] &= \left[4.1630, 4.1640, -1.297868721 \cdot 10^5 \right] \\
\left[a_{66}, a_{67}, J\left(\delta_a, a_{67}, a_{66}\right) \right] &= \left[4.1640, 4.1650, -1.138722960 \cdot 10^5 \right] \\
\left[a_{67}, a_{68}, J\left(\delta_a, a_{68}, a_{67}\right) \right] &= \left[4.1650, 4.1660, -97926.54497 \right] \\
\left[a_{68}, a_{69}, J\left(\delta_a, a_{69}, a_{68}\right) \right] &= \left[4.1660, 4.1670, -81949.57994 \right] \\
\left[a_{69}, a_{70}, J\left(\delta_a, a_{70}, a_{69}\right) \right] &= \left[4.1670, 4.1680, -65941.36176 \right] \\
\left[a_{70}, a_{71}, J\left(\delta_a, a_{71}, a_{70}\right) \right] &= \left[4.1680, 4.1690, -49901.85125 \right] \\
\left[a_{71}, a_{72}, J\left(\delta_a, a_{72}, a_{71}\right) \right] &= \left[4.1690, 4.1700, -33831.00920 \right]
\end{aligned}$$

(1)

