```
"C:\Program Files\Java\jdk-14.0.1\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2020.1.1\lib\idea_rt.jar=51253:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2020.1.1\bin" -Dfile.encoding=UTF-8 -classpath C:\Users\ctqdt\IdeaProjects\CS3010_Project_3\out\production\CS3010_Project_3 com.company.Main

@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
                        Equation: f(x) = 2x^3 - 11.7x^2 + 17.7x - 5
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@

    Consider true root of this equation to be x_1 = 0.36509

****************************************************
                 BISECTION METHOD
****************************************************
  n        a_n        b_n        c_n     f(a_n)     f(b_n)     f(c_n)   approx e     true e
----------------------------------------------------------------------------------------------------
  0     0.0000     1.0000     0.5000    -5.0000     3.0000     1.1750        N/A     0.1349
  1     0.0000     0.5000     0.2500    -5.0000     1.1750    -1.2750     1.0000     0.1151
  2     0.2500     0.5000     0.3750    -1.2750     1.1750     0.0977     0.3333     0.0099
  3     0.2500     0.3750     0.3125    -1.2750     0.0977    -0.5503     0.2000     0.0526
  4     0.3125     0.3750     0.3438    -0.5503     0.0977    -0.2169     0.0909     0.0213
  5     0.3438     0.3750     0.3594    -0.2169     0.0977    -0.0573     0.0435     0.0057
  6     0.3594     0.3750     0.3672    -0.0573     0.0977     0.0208     0.0213     0.0021
  7     0.3594     0.3672     0.3633    -0.0573     0.0208    -0.0181     0.0108     0.0018
  8     0.3633     0.3672     0.3652    -0.0181     0.0208     0.0014     0.0053     0.0001

****************************************************
               FALSE POSITION METHOD
****************************************************
  n        a_n        b_n     f(a_n)     f(b_n)        c_n     f(c_n)   approx e     true e
----------------------------------------------------------------------------------------------------
  0     0.0000     1.0000    -5.0000     3.0000     0.6250     1.9805        N/A     0.2599
  1     0.0000     0.6250    -5.0000     1.9805     0.4477     0.7585     0.3961     0.0826
  2     0.0000     0.4477    -5.0000     0.7585     0.3887     0.2298     0.1517     0.0236
  3     0.0000     0.3887    -5.0000     0.2298     0.3716     0.0646     0.0460     0.0065
  4     0.0000     0.3716    -5.0000     0.0646     0.3669     0.0178     0.0129     0.0018
  5     0.0000     0.3669    -5.0000     0.0178     0.3656     0.0049     0.0036     0.0005

****************************************************
               NEWTON RAPHSON METHOD
****************************************************
  n        x_n     f(x_n)    f'(x_n)      x_n+1   f(x_n+1)  f'(x_n+1)   approx e     true e
----------------------------------------------------------------------------------------------------
  0     0.0000    -5.0000    17.7000     0.2825    -0.8886    11.5686     1.0000     0.0826
  1     0.2825    -0.8886    11.5686     0.3593    -0.0581    10.0671     0.2138     0.0058
  2     0.3593    -0.0581    10.0671     0.3651    -0.0003     9.9571     0.0158     0.0000
  3     0.3651    -0.0003     9.9571     0.3651    -0.0000     9.9565     0.0001     0.0000

****************************************************
                   SECANT METHOD
****************************************************
  n      x_n-1   f(x_n-1)        x_n     f(x_n)      x_n+1   f(x_n+1)   approx e     true e
----------------------------------------------------------------------------------------------------
  0     0.0000    -5.0000     1.0000     3.0000     0.6250     1.9805     0.6000     0.2599
  1     1.0000     3.0000     0.6250     1.9805    -0.1034    -6.9585     7.0417     0.4685
  2     0.6250     1.9805    -0.1034    -6.9585     0.4636     0.8904     1.2231     0.0985
  3    -0.1034    -6.9585     0.4636     0.8904     0.3993     0.3293     0.1611     0.0342
  4     0.4636     0.8904     0.3993     0.3293     0.3615    -0.0356     0.1044     0.0036
  5     0.3993     0.3293     0.3615    -0.0356     0.3652     0.0012     0.0101     0.0001
  6     0.3615    -0.0356     0.3652     0.0012     0.3651     0.0000     0.0003     0.0000

****************************************************
              MODIFIED SECANT METHOD
****************************************************
  n        x_n     f(x_n)          d    d + x_n  f(d + x_n)     x_n+1   approx e     true e
----------------------------------------------------------------------------------------------------
  0     0.5000     1.1750     0.0050     0.5050     1.2123     0.3424     0.4602     0.0227
  1     0.3424    -0.2307     0.0017     0.3441    -0.2129     0.3647     0.0610     0.0004
  2     0.3647    -0.0044     0.0006     0.3653     0.0018     0.3651     0.0012     0.0000
```

```
    Consider true root of this equation to be x_2 = 1.92174

**************************************************
                BISECTION METHOD
**************************************************
  n         a_n         b_n         c_n      f(a_n)      f(b_n)      f(c_n)    approx e      true e
--------------------------------------------------------------------------------------------------
  0      1.5000      2.0000      1.7500      1.9750     -0.4000      0.8625         N/A      0.1717
  1      1.7500      2.0000      1.8750      0.8625     -0.4000      0.2383      0.0667      0.0467
  2      1.8750      2.0000      1.9375      0.2383     -0.4000     -0.0806      0.0323      0.0158
  3      1.8750      1.9375      1.9063      0.2383     -0.0806      0.0791      0.0164      0.0155
  4      1.9063      1.9375      1.9219      0.0791     -0.0806     -0.0007      0.0081      0.0001

**************************************************
              FALSE POSITION METHOD
**************************************************
  n         a_n         b_n      f(a_n)      f(b_n)         c_n      f(c_n)    approx e      true e
--------------------------------------------------------------------------------------------------
  0      1.5000      2.0000      1.9750     -0.4000      1.9158      0.0304         N/A      0.0060
  1      1.9158      2.0000      0.0304     -0.4000      1.9217      0.0000      0.0031      0.0000

**************************************************
              NEWTON RAPHSON METHOD
**************************************************
  n         x_n      f(x_n)     f'(x_n)       x_n+1    f(x_n+1)   f'(x_n+1)    approx e      true e
--------------------------------------------------------------------------------------------------
  0      1.5000      1.9750     -3.9000      2.0064     -0.4327     -5.0959      0.2524      0.0847
  1      2.0064     -0.4327     -5.0959      1.9215      0.0012     -5.1101      0.0442      0.0002
  2      1.9215      0.0012     -5.1101      1.9217     -0.0000     -5.1102      0.0001      0.0000

**************************************************
                SECANT METHOD
**************************************************
  n       x_n-1    f(x_n-1)         x_n      f(x_n)       x_n+1    f(x_n+1)    approx e      true e
--------------------------------------------------------------------------------------------------
  0      1.5000      1.9750      2.0000     -0.4000      1.9158      0.0304      0.0440      0.0060
  1      2.0000     -0.4000      1.9158      0.0304      1.9217      0.0000      0.0031      0.0000

**************************************************
            MODIFIED SECANT METHOD
**************************************************
  n         x_n      f(x_n)           d     d + x_n  f(d + x_n)       x_n+1    approx e      true e
--------------------------------------------------------------------------------------------------
  0      1.5000      1.9750      0.0150      1.5150      1.9159      2.0013      0.2505      0.0795
  1      2.0013     -0.4064      0.0300      2.0313     -0.5592      1.9214      0.0416      0.0004
  2      1.9214      0.0018      0.0577      1.9791     -0.2931      1.9217      0.0002      0.0000

    Consider true root of this equation to be x_3 = 3.56316

**************************************************
                BISECTION METHOD
**************************************************
  n         a_n         b_n         c_n      f(a_n)      f(b_n)      f(c_n)    approx e      true e
--------------------------------------------------------------------------------------------------
  0      3.5000      4.0000      3.7500     -0.6250      6.6000      2.3125         N/A      0.1868
  1      3.5000      3.7500      3.6250     -0.6250      2.3125      0.6867      0.0345      0.0618
  2      3.5000      3.6250      3.5625     -0.6250      0.6867     -0.0069      0.0175      0.0007
  3      3.5625      3.6250      3.5938     -0.0069      0.6867      0.3303      0.0087      0.0306

**************************************************
              FALSE POSITION METHOD
**************************************************
  n         a_n         b_n      f(a_n)      f(b_n)         c_n      f(c_n)    approx e      true e
--------------------------------------------------------------------------------------------------
  0      3.5000      4.0000     -0.6250      6.6000      3.5433     -0.2052         N/A      0.0199
  1      3.5433      4.0000     -0.2052      6.6000      3.5570     -0.0641      0.0039      0.0061

**************************************************
              NEWTON RAPHSON METHOD
**************************************************
```

```
  n         x_n      f(x_n)     f'(x_n)       x_n+1    f(x_n+1)   f'(x_n+1)    approx e      true e
-------------------------------------------------------------------------------------------------------
  0      3.5000     -0.6250      9.3000      3.5672      0.0426     10.5771      0.0188      0.0040
  1      3.5672      0.0426     10.5771      3.5632      0.0002     10.4990      0.0011      0.0000

**************************************************
                    SECANT METHOD
**************************************************
  n       x_n-1    f(x_n-1)         x_n      f(x_n)       x_n+1    f(x_n+1)    approx e      true e
-------------------------------------------------------------------------------------------------------
  0      3.5000     -0.6250      4.0000      6.6000      3.5433     -0.2052      0.1289      0.0199
  1      4.0000      6.6000      3.5433     -0.2052      3.5570     -0.0641      0.0039      0.0061

**************************************************
              MODIFIED SECANT METHOD
**************************************************
  n         x_n      f(x_n)           d     d + x_n  f(d + x_n)       x_n+1    approx e      true e
-------------------------------------------------------------------------------------------------------
  0      3.5000     -0.6250      0.0350      3.5350     -0.2880      3.5649      0.0182      0.0018
  1      3.5649      0.0184      0.1248      3.6897      1.4874      3.5633      0.0004      0.0002

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                          Equation: f(x) = x + 10 - xcosh(50/x)
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@

    Consider true root of this equation to be: 126.632

**************************************************
                  BISECTION METHOD
**************************************************
  n         a_n         b_n         c_n      f(a_n)      f(b_n)      f(c_n)    approx e      true e
-------------------------------------------------------------------------------------------------------
  0   123.0000    127.0000    125.0000     -0.3033      0.0297     -0.1340         N/A      1.6320
  1   125.0000    127.0000    126.0000     -0.1340      0.0297     -0.0515      0.0079      0.6320

**************************************************
               FALSE POSITION METHOD
**************************************************
  n         a_n         b_n      f(a_n)      f(b_n)         c_n      f(c_n)    approx e      true e
-------------------------------------------------------------------------------------------------------
  0   123.0000    127.0000     -0.3033      0.0297    126.6434      0.0009         N/A      0.0114
  1   123.0000    126.6434     -0.3033      0.0009    126.6328      0.0000      0.0001      0.0008

**************************************************
               NEWTON RAPHSON METHOD
**************************************************
  n         x_n      f(x_n)     f'(x_n)       x_n+1    f(x_n+1)   f'(x_n+1)    approx e      true e
-------------------------------------------------------------------------------------------------------
  0   123.0000     -0.3033      0.0861    126.5242     -0.0088      0.0812      0.0279      0.1078
  1   126.5242     -0.0088      0.0812    126.6323     -0.0000      0.0810      0.0009      0.0003

**************************************************
                    SECANT METHOD
**************************************************
  n       x_n-1    f(x_n-1)         x_n      f(x_n)       x_n+1    f(x_n+1)    approx e      true e
-------------------------------------------------------------------------------------------------------
  0   123.0000     -0.3033    127.0000      0.0297    126.6434      0.0009      0.0028      0.0114
  1   127.0000      0.0297    126.6434      0.0009    126.6324     -0.0000      0.0001      0.0004

**************************************************
              MODIFIED SECANT METHOD
**************************************************
  n         x_n      f(x_n)           d     d + x_n  f(d + x_n)       x_n+1    approx e      true e
-------------------------------------------------------------------------------------------------------
  0   123.0000     -0.3033      1.2300    124.2300     -0.1985    126.5609      0.0281      0.0711
  1   126.5609     -0.0058    155.6699    282.2307      5.5594    126.7232      0.0013      0.0912

Process finished with exit code 0
```