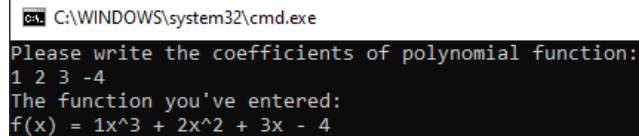# Project 04: Numerical Integration
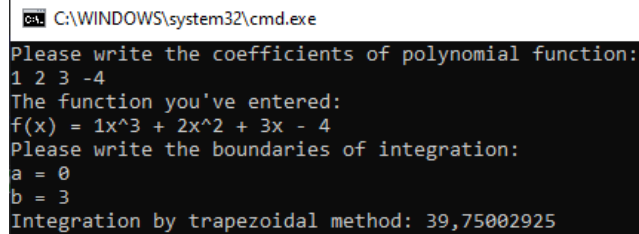
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December 11, 2019

Your task is to write a program, that for a given function will find its integral in the given boundaries Two methods will be used: Trapezoidal and Simpson's, and as for functions either polynomial functions (easier) or full range of functions entered through Reverse Polish Notation Calculator. On pictures you have my take on this tasks, but if you have your own (probably better) idea, go with it!

1. (4 points) Ask the user to provide a coefficients for polynomial function and display how that polynomial function would look like.

    ```
    C:\WINDOWS\system32\cmd.exe
    Please write the coefficients of polynomial function:
    1 2 3 -4
    The function you've entered:
    f(x) = 1x^3 + 2x^2 + 3x - 4
    ```

2. (4 points) Using the pseudocode from the notes implement Trapezoidal rule for numerical integration and based on the input provided by the user (function and integration boundaries) calculate what is the integral:
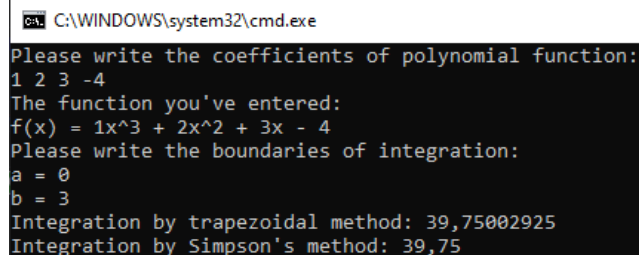
    ```
    C:\WINDOWS\system32\cmd.exe
    Please write the coefficients of polynomial function:
    1 2 3 -4
    The function you've entered:
    f(x) = 1x^3 + 2x^2 + 3x - 4
    Please write the boundaries of integration:
    a = 0
    b = 3
    Integration by trapezoidal method: 39,75002925
    ```

3. (4 points) Implement Simpson's method for calculating the integral and also display the result:

    ```
    C:\WINDOWS\system32\cmd.exe
    Please write the coefficients of polynomial function:
    1 2 3 -4
    The function you've entered:
    f(x) = 1x^3 + 2x^2 + 3x - 4
    Please write the boundaries of integration:
    a = 0
    b = 3
    Integration by trapezoidal method: 39,75002925
    Integration by Simpson's method: 39,75
    ```

4. (8 points) Implement the RPN calculator as from the notes and allow user to enter any equation that he or she likes. Calculate the integrals of course!

```
C:\WINDOWS\system32\cmd.exe

Please write the function:
x ^ 2 + 7 * x - 1 / x
The function you've entered:
x ^ 2 + 7 * x - 1 / x
Please write the boundaries of integration:
a = 5
b = 9
Integration by trapezoidal method: 396,745557298225
Integration by Simpson's method: 396,745546668431
```