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Tartalomjegyzék

Sage

Server

https://jupyter.math.bme.hu:8888/

You can log in with your **leibniz** username and password.

You can use this, or install it on your own from here: http://www.sagemath.org/

Tasks

Using variables

1. Let Y be your year of birth, M the month, and D the day, create these variables.
2. How much is Y divided by D? Associate this value with the b variable.
3. Let r be the remainder of Y / M.
4. What's the difference r - b?

Symbolic calculations

1. Is it true that the square root of the square of a number is the number itself?
    1. Use **bool** to convert to logical value
    2. Is it true for real numbers? Positive numbers? (**assume**)
2. Prove $(x - y)(x + y) = x^2 - y^2$
3. Prove $(-1)^{2n} = 1$ where **n** is integer!

Sage functions, methods

1. Is 2019 a prime? (use the *is_prime()* function)
    - ♦ try to find a big prime number just by trial and error!
2. Were you born on a prime day? (use the D variable!)
3. Solve the equation $Dx^2 + Mx - br = 0$ using the *solve(f, variable)* function!
    - ♦ *x* needs to be a symbolic variable!
    - ♦ *f* can be a function, formula or an equation.
4. Solve the equation numerically! Use the *find_root(f, min, max)* function, where min and max defines an interval where Sage looks for the solution.
    - ♦ this only works is you have one variable!
5. Solve the above equation symbolically (make D, M, b, r symbolic variables, then use solve)!
6. Differentiate the function $\sin(x) \cdot \cos(x) \cdot x^2$.
7. Integrate the previous function.
8. Calculate the limit of $\lim_{n\to\infty} \left(1 + \frac{3}{n}\right)^{4n}$
9. Let f be the following function: f(x,y) = (x+2*y)^3
10. Substitute 3 into x; then 4 into x and 2 into y. What's the result? (use the *subs()* method of f)
11. Expand f! (*expand()*)
12. Using the above, calculate the Taylor series of $\sin(x) \cdot \cos(x) \cdot x^2$ up until the 4th member. (you can differentiate and integrate a function **f** by **f.diff(x)**)

Plotting with Sage (plot)

1. Plot a cosine curve from 0 to 4*pi!
2. Plot the $(x - 2)^2 + 3$ polynomial from -2 to 4, color it green!
3. Plot next to the previous one (using the *show* function) the function $x^3 - 3 * x + 6$ in red!
4. Plot a circle: *cirlce((coordinates of the center), radius, optional)*. The "http://wiki.math.bme.huoptional"http://wiki.math.bme.hu can be: color, *aspect_ratio=True* so that the ratio of the x and y axis are kept, otherwise we might get an ellipse.

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