Worksheet 1 - Getting Help

Finding help

There are various ways of getting help in Sage.

Tab completion

Does Sage have a command for defining a permutation? (Hint: Start typing `Perm` and then hit the tab key.)

?: documentation and examples

To see documentation and examples for the Permutation command, type `Permutation?` and hit tab (or enter).

Exercise: Create the permutation 51324 and assign it to the variable `p`.

Exercise: Find the inverse and the length of `p`. (Hint: to see the methods available to `p`, you can type '`p.`' and hit tab.)

Exercise: Does `p` have the pattern 123? What about 1234? And 312?

??: get source code

To see the how the inverse of `p` is computed, type `p.inverse??` and hit tab (or enter).

Searching documentation

There are other ways to get help.

- Click on Help on the top right of this page.
- Use the command 'search_doc'.
- Use the command 'search_src'.
- Use the command 'search_def'.

Exercise: Use 'search_doc' to find information about Taylor series, then define the function $f(t) = sin(t)$ and find its Taylor series expanded about $t = 0$ up to degree 14.

Exercise: Can you guess an expression for the n-th term of the Taylor series of f? (Hint: you might find the command `sloane_find` useful in finding an expression for the denominators.)

Project Euler

Several of your exercises will from from Project Euler:

> *Project Euler* is a series of challenging mathematical/computer programming problems that will require more than just mathematical insights to solve. Although mathematics will help you arrive at elegant and efficient methods, the use of a computer and programming skills will be required to solve most problems.
>
> Each problem has been designed according to a "one-minute rule", which means that although it may take several hours to design a successful algorithm with more difficult problems, an efficient implementation will allow a solution to be obtained on a modestly powered computer in less than one minute.

Exercise: Go to the Project Euler website (www.projecteuler.net) and create an account.

Project Euler Problem 3

> The prime factors of 13195 are 5, 7, 13 and 29.
>
> What is the largest prime factor of the number 600851475143 ?

(After you solve this problem, visit the Project Euler website and enter your answer. Visit the forums and read some of the other solutions. Pick one that you like best.)

Project Euler Problem 5

> 2520 is the smallest number that can be divided by each of the numbers from 1 to 10 without any remainder.
>
> What is the smallest number that is *evenly divisible* by all of the numbers from 1 to 20?

(After you solve this problem, visit the Project Euler website and enter your answer. Visit the forums and read some of the other solutions. Pick one that you like best.)