Day3-Lab-Exercises

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1 Exercise

Implement the following function

$$h(t) = \exp^{-t} \sin(\pi t).$$

Print out $h(0)$ and $h(1)$

2 Exercise

Now we extend the function $h(t)$ in exercise 1 to

$$g(t) = \exp^{-a} \sin(\pi t)$$

where a is a parameter. Print out $g(0)$ and $g(1)$ for $a = 10$

3 Exercise

Make a Python function $normal(x, m = 0, s = 1)$ for computing the Gaussian function

$$f(x) = \frac{1}{\sqrt{2\pi}\, s} \exp\left[-\frac{1}{2}\left(\frac{x-m}{s}\right)^2\right].$$

Write out a nicely formatted table of x and $f(x)$ values for n uniformly spaced x values in $[m - 5s, m + 5s]$. Choose m, s, and n as you like.

4 Exercise

Write a function that does the following:

$$n! = n(n-1)(n-2)\cdots 2\cdot 1$$

5 Exercise

Write a function that returns the minimum and maximum of a function $g(x)$ on $[a, b]$. Test the function for $g(x) = \sin x$ and $x \in [-\pi/2, 2\pi]$

Hint: The evaluation points x can be uniformly distributed: $x_i = a + ih$, $i = 1, 2, \ldots, n-1$, $h = (b-a)/n - 1$

6 Exercise

Write a function $get\_pair(dna, pair)$ that counts the number of occurrences of a pair of characters (pair) in a DNA string (dna). For example, $get\_pair('ACTGCTATCCATT', 'AT')$ will return 2.

7 Exercise

Write a function that takes a DNA strand and produces it complementary.
Note: The mecanism will be explain in class.