2. Curve parametrization

Files: The accompanying files for this assignments are `assignment2_1.html`, `assignment2_2.html`, and `assignment2_3.html`.
Delivery: upload the modified HTML files and any other necessary files to the Racó. All explanations and/or answers to the problems should be included in the HTML files.

Problem 1.

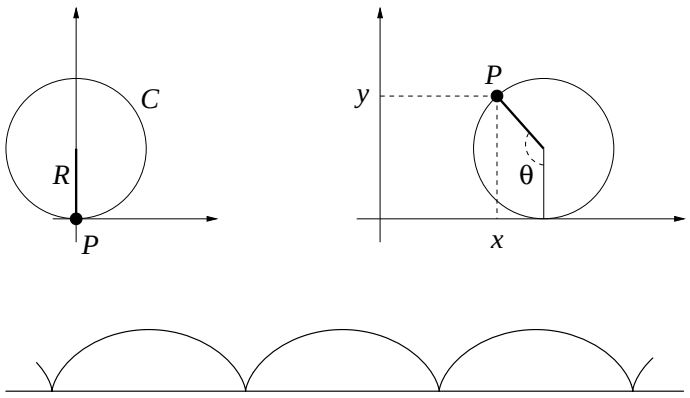
Write a program to draw the following curves, allowing the user to modify the curve parameters:

- An elliptical helix (3D).
- A spiral helix (3D).

Problem 2. Illustrate the reflection property of the parabola: all rays parallel to the axis of the parabola reflect in the parabola into concurrent rays through the focus of the parabola. For the illustration, consider the parabola $y = x^2/200$ together with at least half a dozen vertical rays: (i) write a program to compute and show the reflection of the rays; (ii) find the coordinates of the focus and justify your answer.

Problem 3.

Write a program to draw the curve shown in the figure below. The curve is described by a point P of a circle C, when C rolls over a line ℓ. Consider the line $y = 0$ as ℓ,



and let C have radius R. Suppose that when the parameter θ equals 0, C is centered at $x = 0$, and P coincides with the origin. Find a parametrization of the curve described by point P as C rolls over ℓ, and show the result.

Justify the parametrization obtained, explaining how you arrived to it.