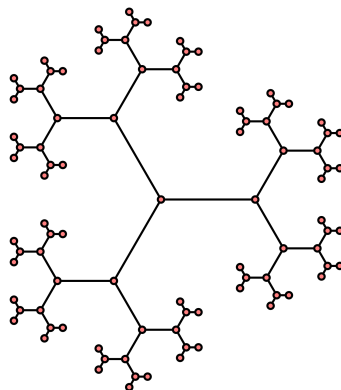


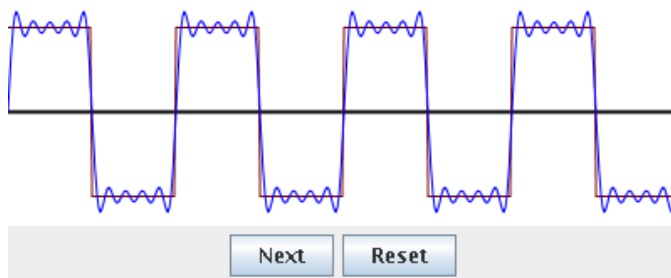
JyScript Exercises

Exercise 1: Create the following figure in a 400×400 frame. You may wish to think of this as a tree of height three whose root is in the middle and has three children. Each other node has two children. As we descend the tree, the length of the edges are scaled by a factor of, say, 0.6.

JyScript has a function `pcircle(x, y, r)` that draws a circle at the point (x, y) in the current coordinate system having a radius of r pixels.



Exercise 2: Yesterday you worked on a PiScript exercise to graph the Fourier series approximation to the square wave. Create a JyScript program that graphs the square wave over the interval $[-4, 4]$ and the Fourier approximation with n terms. Include two buttons, one that increases the number of terms and one that resets the number of terms.



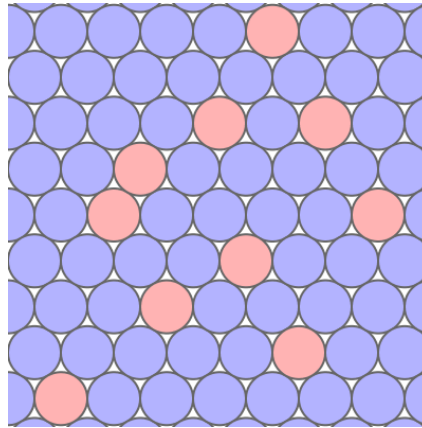
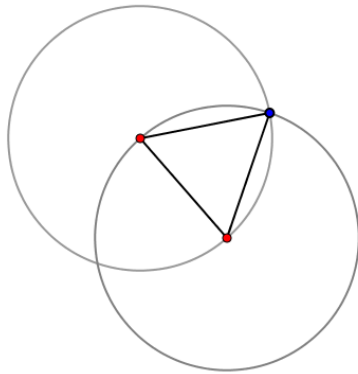
The square wave is the periodic function f of period 2 where $f(x) = 1$ if $0 \leq x < 1$ and $f(x) = -1$ if $1 \leq x < 2$. The n^{th} term in the Fourier series is

$$\frac{4 \sin((2n - 1)\pi x)}{\pi (2n - 1)}.$$

Exercise 3: Create an animation that graphs the function $f(x) = x^3 + cx$ as c varies from -1 to 1

Exercise 4: Shown below on the left is an explanation of Proposition 1 of Book 1 of *The Elements*, which says, in modern terms, that any pair of distinct points form two vertices of an equilateral triangle.

Create this figure in a JyScript program containing two moveable points.



Exercise 5: Draw the packing of circles on a hexagonal grid shown to the right above. Originally, the circles should all be blue. Clicking in a blue circle changes its color to red and clicking in a red circle changes its color to blue. Be sure to call `point.listenToClicksOnly(True)` on your `Moveablepoint`.

Exercise 6: Remember Euler’s formula, which says that

$$e^{ix} = \cos x + i \sin x.$$

If we use the Taylor series for e^z , we have

$$e^{ix} = 1 + ix - \frac{x^2}{2} - i\frac{x^3}{3!} + \frac{x^4}{4!} + \dots$$

The following is a visual explanation of Euler’s formula obtained by adding the terms in the Taylor series. Create this figure as an animation in which x varies from 0 to 3.

