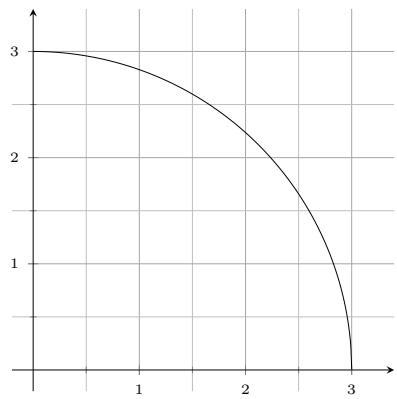
The general goal of this pre-class activity is to answer the following question: how can we compute the area under a curve by using successive approximations.

Let us consider the quarter of a disc of radius 3. The function is given by $f(x) = \sqrt{9 - x^2}$ between $x = 0$ and $x = 3$.



1. Compute the actual area of this quarter of a circle.

2. Compute the approximation of this area using 3 right-handed rectangles. Remember that we have seen in class that in this case, the rectangle between 2 and 3 is actually "flat". (you need to use the formula of the function as well as a calculator).

3. Compute the approximation of this area using 6 right-handed rectangles. (you need to use the formula of the function as well as a calculator).

4. Which of the two approximations is the best? What would happen if we used 100 rectangles? Then, how could we improve even further this last approximation?

5. Since when taking right-handed rectangles the one that has $x = 3$ as a side (i.e. the rectangle that is the most on the right-hand side) is always flat, can we ever find the actual area under this curve by using approximations with rectangles?

6. Would we get different results if we had used left-handed (instead of right-handed) rectangles in parts 2 and 3?

7. Is there a way to "reconcile" the left-handed and right-handed approximations?