RUPRECHT-KARLS-
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Exercise:
SKILL

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Exercise A ('warmup'):

- Calculate 1 + 1
- What is Sinus (1)? % (radian)
- Find a way to get π

- Define two variables *x* and *y*, set them to 2 and 3 and multiply them

- Let *p* be a *list* of two float values
- Get the first and second element of the list *p*

- Add the first and second element directly (in one command)

- Define a function (Double ..) which outputs the double of a (float) argument

Exercise B: Area of a Rectangle

- Calculate the area of a rectangle (a list of two points)

- Define a function **`area`** which does this

For

- **`(setq A list(1:2 3:4))`**

your function

- **`(area A)`**

should return

- **`4`**

Exercise C: Sum of Elements

- Define a function **`sumup`** which calculates the sum of the elements of a list
  - Assume all elements are numbers
- Write 2 different versions at least:
  - Using **`foreach`**
  - Explicitly picking the **`nth`** element (i.e. using an index)
- You could try two more versions:
  - Stepping through the list with **`car`** / **`cdr`**
  - A recursive version

Exercise D: Objects in a Layout

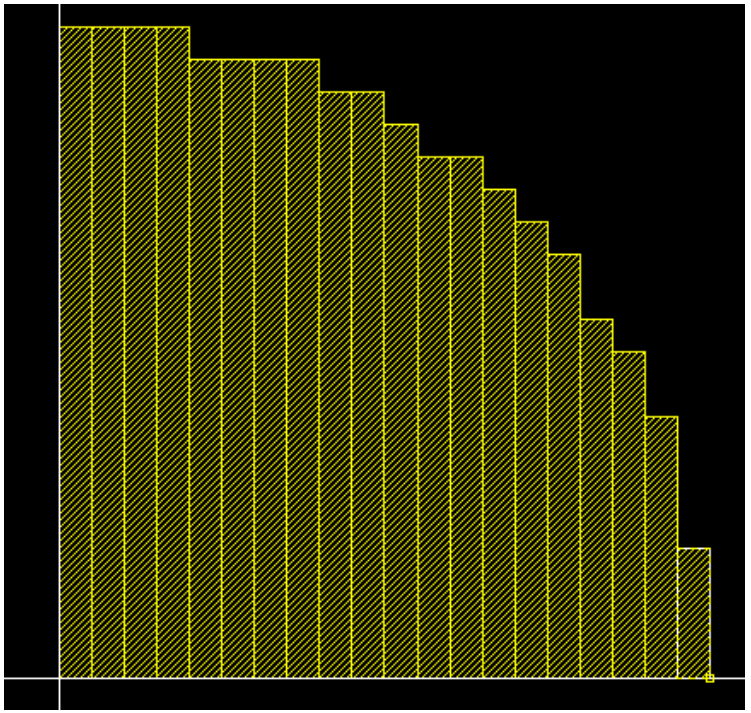
- Create a new layout. Create a rectangle on *metal1* and a path on *poly* by hand.
- From the CIW store the ID of the view in **`myID`**
- What is **`myID~>shapes`** ?
- Examine the two objects

- In the CIW: Assign a new value to the bounding box of the rectangle and check what happens in the open cell view.

- Create a new rectangle using the command from the lecture
- Search in the manual how to place a circle or a path.

Exercise E: Making a Binned Circle

- Write a routine to create a circle (quadrant) from man small rectangular stripes
  - Fix the layer to
    `'("ME2" "drawing")`
  - Fix the origin at (0,0)
  - Input parameters are
    - the outer **`radius`**
    - the (x) **`step`** size of the strips
  - It is sufficient to generate a quadrant, i.e. We define a procedure '**`quadrant`**' and call
    `(quadrant radius step)`



- For a start assume that **`radius`** is an integer multiple of **`step`**
- Make sure the y-coordinates are on 'some' grid, for instance multiples of **`step`**

Exercise E: Maths

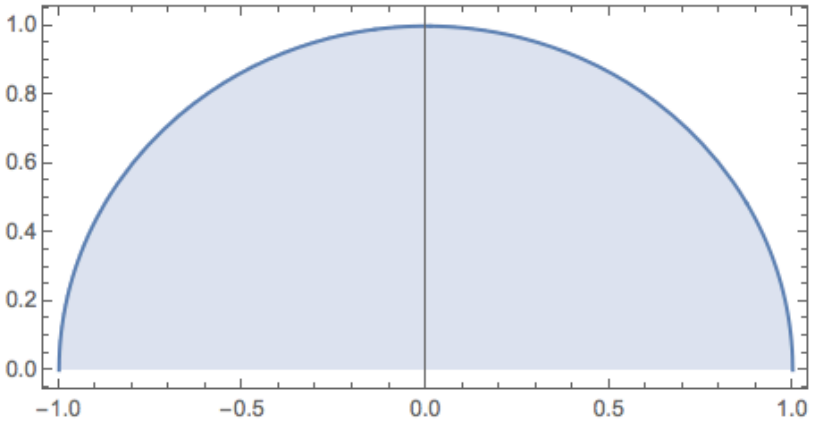
- The formula for the 'ideal' area of a slice is obtained by integration:

In[1]:= $f[R\_, x\_] = \sqrt{R^2 - x^2}$

Out[1]= $\sqrt{R^2 - x^2}$

In[14]:= `Plot[f[1, x], {x, -1, 1}, AspectRatio → 1 / 2, Frame → True, Filling → Axis]`

Out[14]=



In[11]:= `$Assumptions = R > 0 && x1 > -R && x1 < R && x2 > -R && x2 < R && x1 < x2;`

In[12]:= `Integrate[f[R, x], {x, x1, x2}]`

Out[12]= $\frac{1}{2}\left(-x1\sqrt{R^2 - x1^2} + x2\sqrt{R^2 - x2^2} + R^2\left(-\text{ArcTan}\left[\frac{x1}{\sqrt{R^2 - x1^2}}\right] + \text{ArcTan}\left[\frac{x2}{\sqrt{R^2 - x2^2}}\right]\right)\right)$

x1s x2s

Exercise F: Define a Key ShortCut

- Check in your .cdsinit file how the shortcuts for changing the grid are defined
  - Change the message that is printed
  - Add another key for a new grid

- Define a function which places a rectangle (1x1 um^2) at the cursor position
  - You get the cursor position with

```
(hiGetPoint (hiGetCurrentWindow))
```

- Associate the function to a bind key

Exercise G:

- Create a PCELL which generates the quarter circle from exercise E