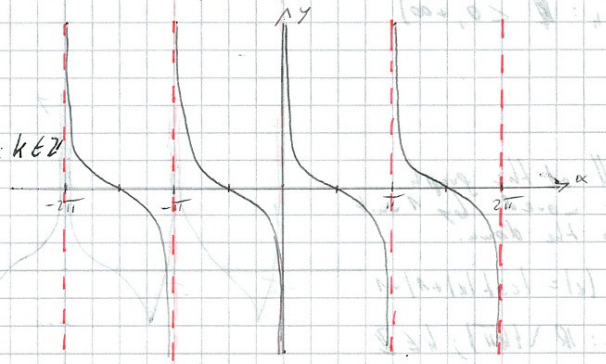
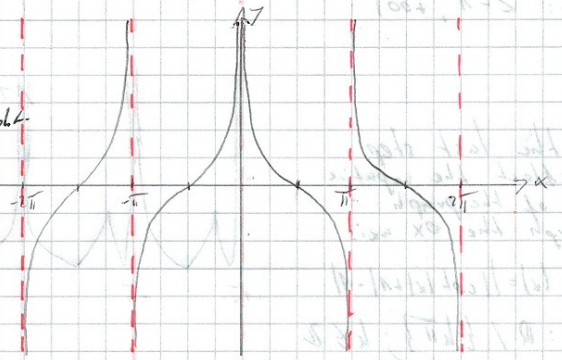
What to say in front of the blackboard – a brief tutorial

Exercise: Draw the graph of $y = |\cot|x| + 1| - 1|$ step by step. Establish the domain and the codomain of each function.

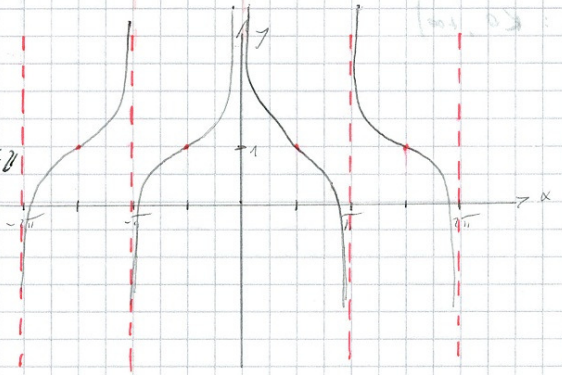
1. I start with
$f_1(x) = \cot(x)$
$D_1 : \mathbb{R} \setminus \{k\pi\};\ k \in \mathbb{Z}$
$C_1 : \mathbb{R}$



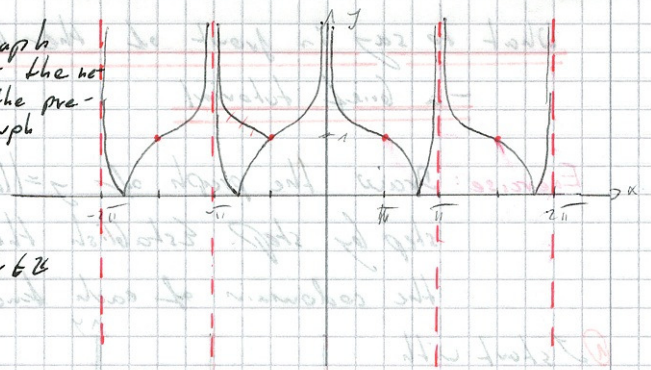
2. I change my previous graph in the following way: everything on the right-hand-side stays the same, and everything on the left-hand-side is its mirror image
$f_2(x) = \cot(|x|)$
$D_2 : \mathbb{R} \setminus \{k\pi\};\ k \in \mathbb{Z}$
$C_2 : \mathbb{R}$



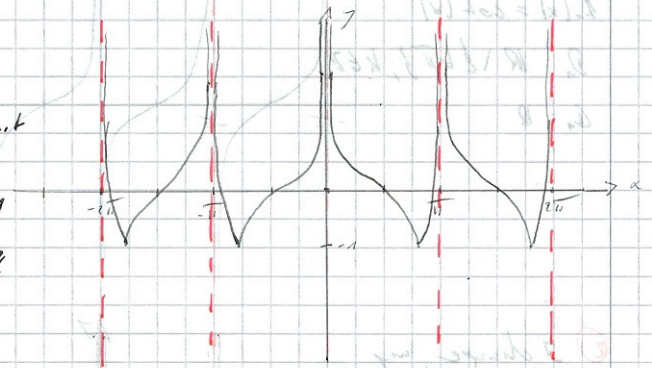
3. I move all of the graph by 1 units to the up
$D_2 : \mathbb{R} \setminus \{k\pi\};\ k \in \mathbb{Z}$
$C_2 : \mathbb{R}$
$f_3(x) = \cot|x| + 1$



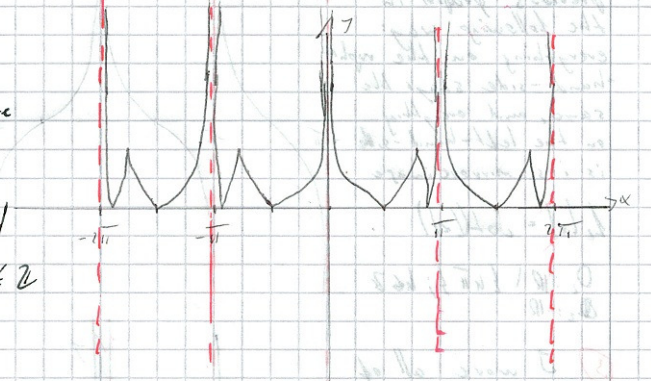
4. In the next graph I reflect the negative part of the previous graph through the Ox axis.
$f_4(x) = |\cot|x| + 1|$
$D_4 : \mathbb{R} \setminus \{k\pi\};\ k \in \mathbb{Z}$
$C_4 : \langle 0, +\infty)$



5. All of the graph is moved by 1 unit to the down.
$f_5(x) = |\cot|x| + 1| - 1$
$D_5 : \mathbb{R} \setminus \{k\pi\};\ k \in \mathbb{Z}$
$C_5 : \langle -1, +\infty)$



6. In the last step I reflect the negative part of the graph through the Ox axis
$f_6(x) = ||\cot|x| + 1| - 1|$
$D_6 : \mathbb{R} \setminus \{k\pi\};\ k \in \mathbb{Z}$
$C_6 : \langle 0, +\infty)$



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What to say in front of the blackboard - a brief tutorial

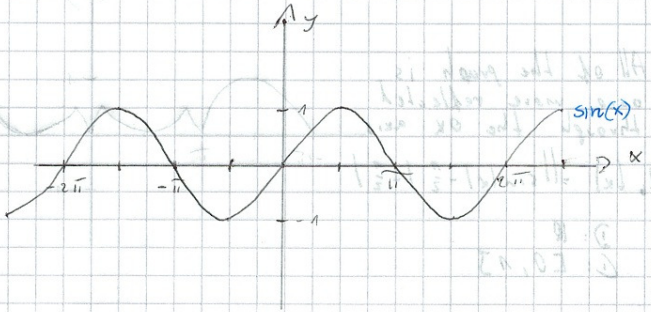
Exercise: Draw the graph of $y = ||\sin|x| - \frac{1}{2}| - \frac{1}{2}|$ step by step. Establish the domain and codomain of each function.

Solution:

(1) I start with $f_1(x) = \sin(|x|)$

$D_1 : \mathbb{R}$

$\mathcal{C}: [-1, 1]$

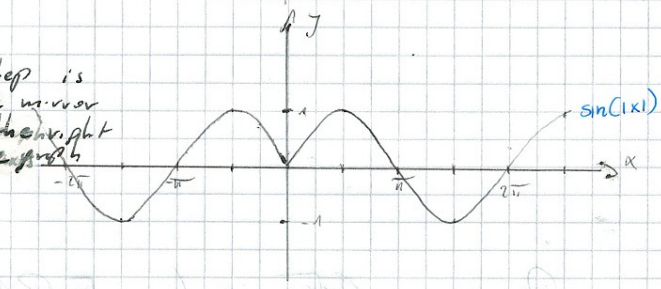


(2) The next step is obtained the mirror image of the right side of the graph

$f_2(x) = \sin(|x|)$

$D: \mathbb{R}$

$\mathcal{C}: [-1, 1]$

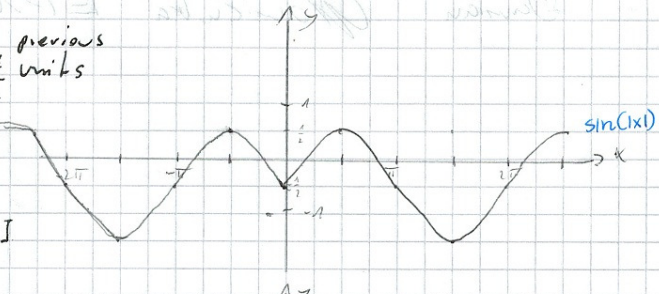


(3) I move my previous graph by $\frac{1}{2}$ units to the down

$f_3(|x|) = \sin|x| - \frac{1}{2}$

$D: \mathbb{R}$

$\mathcal{C}: [-1.5, 0.5]$

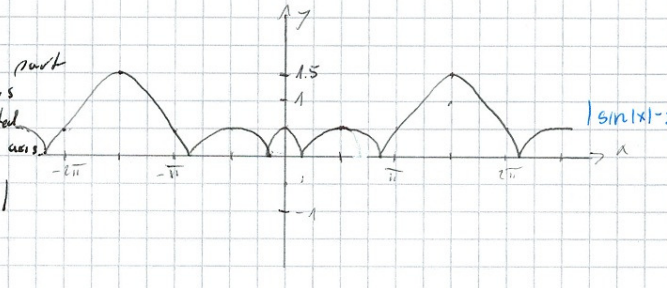


(4) The negative part of the previous graph is reflected through the OX axis

$f_4(x) = |\sin|x| - \frac{1}{2}|$

$D: \mathbb{R}$

$\mathcal{C}: [0, 1.5]$

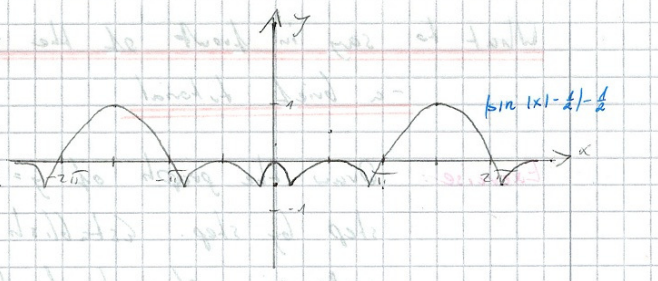


(5) In the next step I again move all of my graph by $\frac{1}{2}$ units to the down

$f_5(x) = |\sin|x| - \frac{1}{2}| - \frac{1}{2}$

$D: \mathbb{R}$

$\mathcal{C}: [-0.5, 1]$

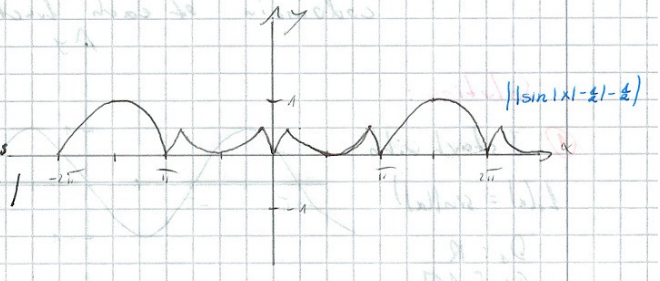


(6) All of the graph is once more reflected through the OX axis

$f_6(x) = ||\sin|x| - \frac{1}{2}| - \frac{1}{2}|$

$D: \mathbb{R}$

$\mathcal{C}: [0, 1]$



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