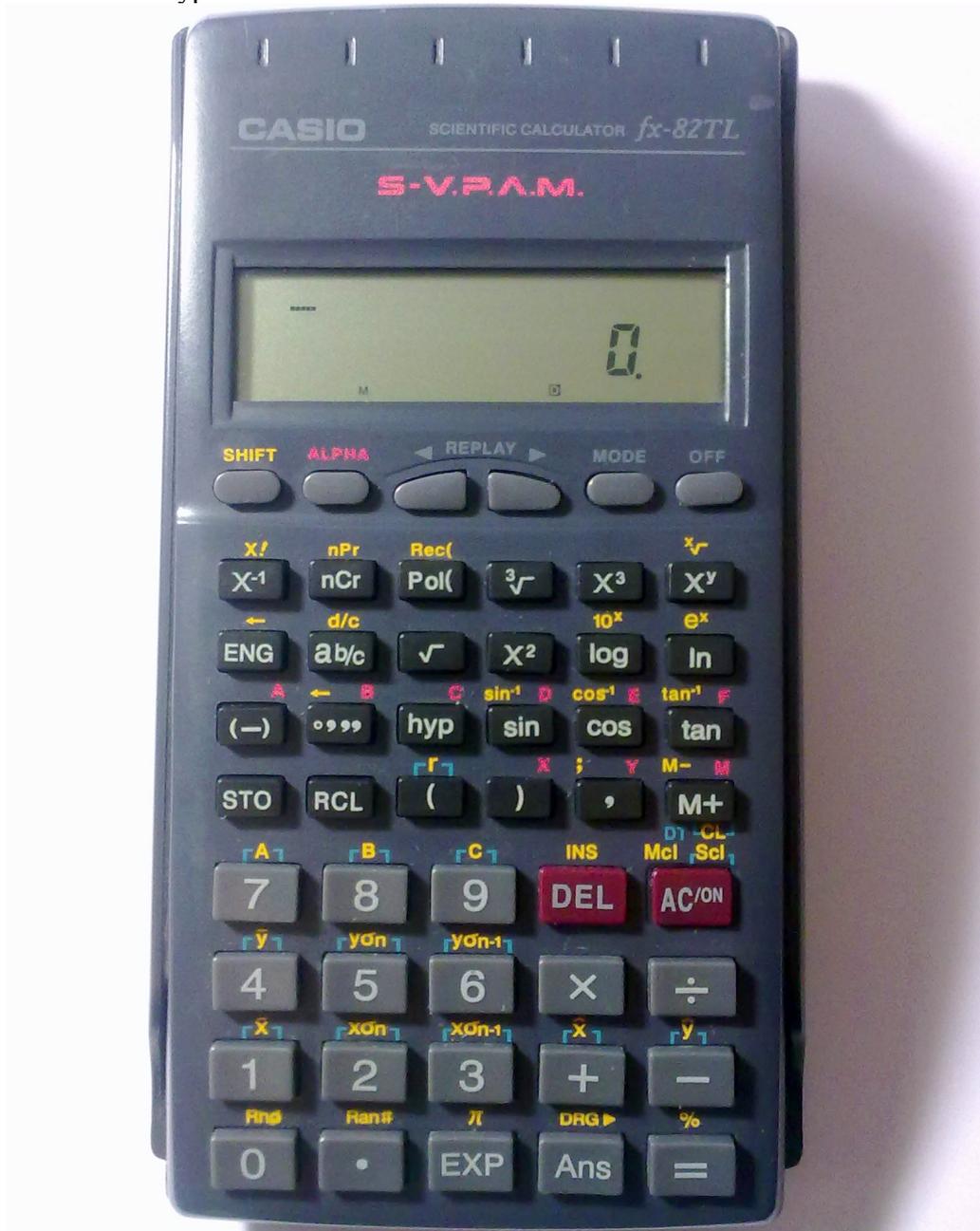


**On the use of modern calculators. P. Borys, 2013.**

Let us take a look on a typical modern calculator:



It has a lot of options and functions. It also has two lines on the display. The upper line allows to enter an **expression** to be evaluated (wow, you don't need to evaluate each addition or multiplication separately in such calculators!); the lower line displays the result. The result may be used in the expression by using the [Ans] key. Let us try to insert some arithmetic expression to the calculator. Please note, that you have braces on the calculator keyboard, which are very useful to assure the correct order of calculations!:

$$\frac{153 + 17}{121 - 153} =$$

could be evaluated by pressing

[([][1][5][3][+][1][7])][÷][([][1][2][1][-][1][5][3])][=]

The result should be: -5.3125.

The calculator allows you to enter numbers in exponential notation. For example to multiply  $3 \cdot 10^3 \cdot 5 \cdot 10^{-5}$

you can enter:

[3][EXP][3][x][5][EXP][-][5][=]

The result should be: 0.15.

You can also calculate any possible powers using the  $[X^y]$  key. For example,  $(3 \cdot 10^5)^6$  could be evaluated by

[()][3][EXP][5][D)][X<sup>y</sup>][6][=]

Which gives  $7.29 \cdot 10^{32}$ . You can also calculate any possible roots. Above the  $[X^y]$  key, in gold there is a symbol for „ $\sqrt[n]{\phantom{x}}$ “. To use such gold letter, we need the **shift** mode, which is turned on by the [shift] key. Let us calculate the root of degree 5 of the same number  $3 \cdot 10^5$ :

[5][shift][X<sup>y</sup>][5][()][3][E][5][D)][=]

Which gives 12.457.

You can also evaluate trigonometric functions. But warning: the calculator can work using **radians** or **degrees**. To ensure your operation mode, press [mode] key few times until in the options you will have a choice like:

Deg	Rad	Gra
1	2	3

Then press [1] to choose **degrees**. Then you can calculate the trigonometric functions in degrees. For example,  $\sin(30)$  would be evaluated by:

[sin][3][0][=]

which should give you 0.5. You can also calculate a sine of expression, for example  $\sin(10+20)$ :

[sin][()][1][0][+][2][0][D)][=]

which gives 0.5 again.

You can also calculate the inverse trigonometric functions: you know the value of a sine (e.g. 0.5), and you want to know what angle it corresponds to. You can do this using the  $\sin^{-1}$  function. This function is denoted in gold letters above the [sin] key, so it requires the use of a [shift] key before:

[shift][sin][0.5][=]

should give 30 (in degrees). In similar way you can calculate cosine, tangent and logarithm. In gold above ln there is also a symbol for  $e^x$ , so you can calculate the exponentials. For example  $e^{(3+1/2)}$  could be evaluated by:

[shift][ln][()][3+[()][1][ ÷ ] [2][D)][=]

which gives 33.115.

I hope this helps...