Greek log-like Operators

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1   What is this all about?

In Greece, until recently, it was common practice to write down most log-like functions as abbreviations of their Greek names. Consequently, high school students and even university freshmen were not familiar with the Latin names employed in international literature. However, this practice is fading away in universities but it is still in wide use in books for high schools, mainly because the Latin names would produce nothing but confusion. The package `grmath` redefines most log-like definitions so that they produce the Greek name, instead of the Latin one. The package can be used only in conjunction with the `greek` option of the `babel` package. The new option `enlog` allows one to keep the Latin names for the log functions.

2   The Implementation

As usual we must first identify ourselves.

```
1 ⟨*package⟩
2 \ProvidesPackage{grmath}[2001/02/12\space v1.2]
3 \typeout{Package: 'grmath' v1.2\space <2001/02/12> (A. Syropoulos)}
```

The next thing we do is to process the options. The default option "grlog" generates Greek names for log functions and the "enlog" option generates Latin names for log functions.

```
4  \DeclareOption{grlog}{%
5    \def\log{\mathop{\mathgroup\symgroperators log_{10}}}\nolimits}
6    \def\ln{\mathop{\mathgroup\symgroperators log_%
7         {\mathgroup\symoperators e}}\nolimits}
8  }
9  \DeclareOption{enlog}{%
10   \def\log{\mathop{\operator@font log}\nolimits}
11   \def\ln{\mathop{\operator@font ln}\nolimits}
12 }
13 \ExecuteOptions{grlog}
14 \ProcessOptions
```

Now we check to see if the `babel` package is loaded with at least the `greek` option. In case it isn't, we opt to produce an error message.

```
15 \@ifpackagewith{babel}{greek}{}{%
16     \@ifpackagewith{babel}{polutonikogreek}{}{%
17     \PackageError{grmath}{%
18     'greek' option of the 'babel'\MessageBreak
19      package hasn't been loaded}{%
20      The commands provided by this package\MessageBreak
21      are specially designed for greek language\MessageBreak
```

```
22        typesetting with the 'babel' package. Load\MessageBreak
23        it with at least the 'greek' option.}\relax
24      }}
```

We define the mathematical font which will be used to typeset the log-like functions.

```
25 \DeclareSymbolFont{groperators}{LGR}{cmr}{m}{n}
26 \SetSymbolFont{groperators}{bold}{LGR}{cmr}{bx}{n}
```

We are now ready to proceed with the redefinitions of the log-like operator names.

```
27 \def\sin{\mathop{\mathgroup\symgroperators hm}\nolimits}
28 \def\cos{\mathop{\mathgroup\symgroperators sun}\nolimits}
29 \def\tan{\mathop{\mathgroup\symgroperators ef}\nolimits}
30 \def\arcsin{\mathop{\mathgroup\symgroperators toxhm}\nolimits}
31 \def\arccos{\mathop{\mathgroup\symgroperators toxsun}\nolimits}
32 \def\arctan{\mathop{\mathgroup\symgroperators toxef}\nolimits}
33 \def\cot{\mathop{\mathgroup\symgroperators sf}\nolimits}
34 \def\sec{\mathop{\mathgroup\symgroperators tem}\nolimits}
35 \def\csc{\mathop{\mathgroup\symgroperators stem}\nolimits}
36 \def\gcd{\mathop{\mathgroup\symgroperators MKD}\nolimits}
```

In the standard LaTeX distribution there is no provision for a Least Common Multiple (lcm) log-like operator. Since, this operator appears quite often in greek literature we opt to include it. Moreover, we include three more log-like functions: \arccot, \arcsec and \arccsc.

```
37 \def\lcm{\mathop{\mathgroup\symgroperators EKP}\nolimits}
38 \def\arccot{\mathop{\mathgroup\symgroperators toxsf}\nolimits}
39 \def\arcsec{\mathop{\mathgroup\symgroperators toxtem}\nolimits}
40 \def\arccsc{\mathop{\mathgroup\symgroperators toxstem}\nolimits}
41 ⟨/package⟩
```

Dedication

I would like to dedicate this piece of work to my son

<div align="center">Demetrios-Georgios.</div>