

# axiom<sup>TM</sup>



## The 30 Year Horizon

|                              |                        |                           |
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| domain DECIMAL DecimalExpansion . . . . .            | 656        |
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| domain DERHAM DeRhamComplex . . . . .                          | 729 |
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| domain DSTREE DesingTree . . . . .                             | 800 |
| DesingTree (DSTREE) . . . . .                                  | 801 |
| domain DSMP DifferentialSparseMultivariatePolynomial . . . . . | 805 |
| DifferentialSparseMultivariatePolynomial (DSMP) . . . . .      | 808 |
| domain DIRPROD DirectProduct . . . . .                         | 811 |
| DirectProduct (DIRPROD) . . . . .                              | 813 |
| domain DPMM DirectProductMatrixModule . . . . .                | 818 |
| DirectProductMatrixModule (DPMM) . . . . .                     | 821 |
| domain DPMO DirectProductModule . . . . .                      | 822 |
| DirectProductModule (DPMO) . . . . .                           | 825 |
| domain DIRRING DirichletRing . . . . .                         | 827 |
| DirichletRing (DIRRING) . . . . .                              | 832 |
| domain DMP DistributedMultivariatePolynomial . . . . .         | 837 |
| DistributedMultivariatePolynomial (DMP) . . . . .              | 844 |
| domain DIV Divisor . . . . .                                   | 845 |
| Divisor (DIV) . . . . .  | 847 |
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| domain DFMAT DoubleFloatMatrix . . . . .                       | 879 |
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| domain D01ALFA d01alfAnnaType . . . . .                        | 909 |
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| domain D01AMFA d01amfAnnaType . . . . .                        | 913 |

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| domain D01APFA d01apfAnnaType . . . . .                             | 922        |
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| domain D01GBFA d01gbfAnnaType . . . . .                             | 940        |
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| domain D01TRNS d01TransformFunctionType . . . . .                   | 944        |
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| domain D02BBFA d02bbfAnnaType . . . . .                             | 951        |
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| domain D02BHFA d02bhfAnnaType . . . . .                             | 956        |
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| domain D02CJFA d02cjfAnnaType . . . . .                             | 962        |
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| domain D02EJFA d02ejfAnnaType . . . . .                             | 966        |
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| domain D03EEFA d03eefAnnaType . . . . .                             | 972        |
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| domain D03FAFA d03fafAnnaType . . . . .                             | 977        |
| d03fafAnnaType (D03FAFA) . . . . .                                  | 978        |
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| ElementaryFunctionsUnivariateLaurentSeries (EFULS) . . . . .        | 983        |
| domain EFUPXS ElementaryFunctionsUnivariatePuisseuxSeries . . . . . | 997        |
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| Equation (EQ) . . . . .   | 1016       |
| domain EQTBL EqTable . . . . .                                      | 1026       |
| EqTable (EQTBL) . . . . .   | 1030       |
| domain EMR EuclideanModularRing . . . . .                           | 1031       |
| EuclideanModularRing (EMR) . . . . .                                | 1033       |
| domain EXIT Exit . . . . .  | 1037       |
| Exit (EXIT) . . . . .   | 1040       |
| domain EXPEXPAN ExponentialExpansion . . . . .                      | 1041       |
| ExponentialExpansion (EXPEXPAN) . . . . .                           | 1044       |
| domain EXPR Expression . . . . .                                    | 1050       |
| Expression (EXPR) . . . . .   | 1062       |
| domain EXPUPXS ExponentialOfUnivariatePuisseuxSeries . . . . .      | 1089       |



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| domain EAB ExtAlgBasis . . . . .                          | 1096 |
| ExtAlgBasis (EAB) . . . . .                               | 1097 |
| domain E04DGFA e04dgfAnnaType . . . . .                   | 1100 |
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| domain E04FDFA e04fdfAnnaType . . . . .                   | 1104 |
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| domain E04GCFA e04gcfAnnaType . . . . .                   | 1110 |
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| domain E04JAFA e04jafAnnaType . . . . .                   | 1116 |
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| domain E04MBFA e04mbfAnnaType . . . . .                   | 1121 |
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| domain E04NAFA e04nafAnnaType . . . . .                   | 1126 |
| e04nafAnnaType (E04NAFA) . . . . .                        | 1127 |
| domain E04UCFA e04ucfAnnaType . . . . .                   | 1131 |
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| Factored (FR) . . . . .   | 1150        |
| domain FILE File . . . . .  | 1169        |
| File (FILE) . . . . .   | 1174        |
| domain FNAME FileName . . . . .                                     | 1178        |
| FileName (FNAME) . . . . .  | 1184        |
| domain FDIV FiniteDivisor . . . . .                                 | 1186        |
| FiniteDivisor (FDIV) . . . . .                                      | 1187        |
| domain FF FiniteField . . . . .                                     | 1192        |
| FiniteField (FF) . . . . .  | 1195        |
| domain FFCG FiniteFieldCyclicGroup . . . . .                        | 1197        |
| FiniteFieldCyclicGroup (FFCG) . . . . .                             | 1200        |
| domain FFCGX FiniteFieldCyclicGroupExtension . . . . .              | 1202        |
| FiniteFieldCyclicGroupExtension (FFCGX) . . . . .                   | 1205        |
| domain FF CGP FiniteFieldCyclicGroupExtensionByPolynomial . . . . . | 1207        |
| FiniteFieldCyclicGroupExtensionByPolynomial (FFCGP) . . . . .       | 1210        |
| domain FFX FiniteFieldExtension . . . . .                           | 1222        |
| FiniteFieldExtension (FFX) . . . . .                                | 1225        |
| domain FFP FiniteFieldExtensionByPolynomial . . . . .               | 1227        |
| FiniteFieldExtensionByPolynomial (FFP) . . . . .                    | 1230        |
| domain FFNB FiniteFieldNormalBasis . . . . .                        | 1240        |
| FiniteFieldNormalBasis (FFNB) . . . . .                             | 1242        |
| domain FFNBX FiniteFieldNormalBasisExtension . . . . .              | 1244        |
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| domain FFNB P FiniteFieldNormalBasisExtensionByPolynomial . . . . . | 1249        |
| FiniteFieldNormalBasisExtensionByPolynomial (FFNB P) . . . . .      | 1252        |
| domain FARRAY FlexibleArray . . . . .                               | 1267        |

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| FlexibleArray (FARRAY) . . . . .                       | 1274 |
| domain FLOAT Float . . . . .                           | 1275 |
| Float (FLOAT) . . . . .                                | 1297 |
| domain FC FortranCode . . . . .                        | 1337 |
| FortranCode (FC) . . . . .                             | 1339 |
| domain FEXPR FortranExpression . . . . .               | 1360 |
| FortranExpression (FEXPR) . . . . .                    | 1363 |
| domain FORTRAN FortranProgram . . . . .                | 1374 |
| FortranProgram (FORTRAN) . . . . .                     | 1376 |
| domain FST FortranScalarType . . . . .                 | 1384 |
| FortranScalarType (FST) . . . . .                      | 1385 |
| domain FTEM FortranTemplate . . . . .                  | 1391 |
| FortranTemplate (FTEM) . . . . .                       | 1392 |
| domain FT FortranType . . . . .                        | 1396 |
| FortranType (FT) . . . . .                             | 1397 |
| domain FCOMP FourierComponent . . . . .                | 1401 |
| FourierComponent (FCOMP) . . . . .                     | 1402 |
| domain FSERIES FourierSeries . . . . .                 | 1404 |
| FourierSeries (FSERIES) . . . . .                      | 1406 |
| domain FRAC Fraction . . . . .                         | 1409 |
| Fraction (FRAC) . . . . .                              | 1416 |
| domain FRIDEAL FractionalIdeal . . . . .               | 1430 |
| FractionalIdeal (FRIDEAL) . . . . .                    | 1432 |
| domain FRMOD FramedModule . . . . .                    | 1439 |
| FramedModule (FRMOD) . . . . .                         | 1440 |
| domain FAGROUP FreeAbelianGroup . . . . .              | 1444 |
| FreeAbelianGroup (FAGROUP) . . . . .                   | 1449 |
| domain FAMONOID FreeAbelianMonoid . . . . .            | 1451 |
| FreeAbelianMonoid (FAMONOID) . . . . .                 | 1452 |
| domain FGROUP FreeGroup . . . . .                      | 1453 |
| FreeGroup (FGROUP) . . . . .                           | 1455 |
| domain FM FreeModule . . . . .                         | 1458 |
| FreeModule (FM) . . . . .                              | 1459 |
| domain FM1 FreeModule1 . . . . .                       | 1462 |
| FreeModule1 (FM1) . . . . .                            | 1464 |
| domain FMONOID FreeMonoid . . . . .                    | 1468 |
| FreeMonoid (FMONOID) . . . . .                         | 1470 |
| domain FNLA FreeNilpotentLie . . . . .                 | 1477 |
| FreeNilpotentLie (FNLA) . . . . .                      | 1479 |
| domain FPARFRAC FullPartialFractionExpansion . . . . . | 1483 |
| FullPartialFractionExpansion (FPARFRAC) . . . . .      | 1493 |
| domain FUNCTION FunctionCalled . . . . .               | 1500 |
| FunctionCalled (FUNCTION) . . . . .                    | 1501 |

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| <b>8 Chapter G</b>   | <b>1503</b> |
| domain GDMP GeneralDistributedMultivariatePolynomial . . . . .     | 1503        |
| GeneralDistributedMultivariatePolynomial (GDMP) . . . . .          | 1513        |
| domain GMODPOL GeneralModulePolynomial . . . . .                   | 1523        |
| GeneralModulePolynomial (GMODPOL) . . . . .                        | 1524        |
| domain GCNAALG GenericNonAssociativeAlgebra . . . . .              | 1527        |
| GenericNonAssociativeAlgebra (GCNAALG) . . . . .                   | 1530        |
| domain GPOLSET GeneralPolynomialSet . . . . .                      | 1540        |
| GeneralPolynomialSet (GPOLSET) . . . . .                           | 1542        |
| domain GSTBL GeneralSparseTable . . . . .                          | 1546        |
| GeneralSparseTable (GSTBL) . . . . .                               | 1549        |
| domain GTSET GeneralTriangularSet . . . . .                        | 1551        |
| GeneralTriangularSet (GTSET) . . . . .                             | 1554        |
| domain GSERIES GeneralUnivariatePowerSeries . . . . .              | 1560        |
| GeneralUnivariatePowerSeries (GSERIES) . . . . .                   | 1563        |
| domain GRIMAGE GraphImage . . . . .                                | 1568        |
| GraphImage (GRIMAGE) . . . . .                                     | 1569        |
| domain GOPT GuessOption . . . . .                                  | 1583        |
| GuessOption (GOPT) . . . . .                                       | 1585        |
| domain GOPT0 GuessOptionFunctions0 . . . . .                       | 1591        |
| GuessOptionFunctions0 (GOPT0) . . . . .                            | 1592        |
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| domain HASHTBL HashTable . . . . .                                 | 1603        |
| HashTable (HASHTBL) . . . . .                                      | 1605        |
| domain HEAP Heap . . . . .   | 1608        |
| Heap (HEAP) . . . . .  | 1619        |
| domain HEXADEC HexadecimalExpansion . . . . .                      | 1626        |
| HexadecimalExpansion (HEXADEC) . . . . .                           | 1631        |
| package HTMLFORM HTMLFormat . . . . .                              | 1635        |
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| HTMLFormat (HTMLFORM) . . . . .                                    | 1641        |
| domain HDP HomogeneousDirectProduct . . . . .                      | 1673        |
| HomogeneousDirectProduct (HDP) . . . . .                           | 1676        |
| domain HDMP HomogeneousDistributedMultivariatePolynomial . . . . . | 1678        |
| HomogeneousDistributedMultivariatePolynomial (HDMP) . . . . .      | 1684        |
| domain HELLFDIV HyperellipticFiniteDivisor . . . . .               | 1686        |
| HyperellipticFiniteDivisor (HELLFDIV) . . . . .                    | 1688        |

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| domain ICP InfClsPt . . . . .   | 1695        |
| InfClsPt (ICP) . . . . .  | 1696        |
| domain ICARD IndexCard . . . . .  | 1698        |
| IndexCard (ICARD) . . . . .   | 1699        |
| domain IBITS IndexedBits . . . . .  | 1702        |
| IndexedBits (IBITS) . . . . .   | 1707        |
| domain IDPAG IndexedDirectProductAbelianGroup . . . . .                               | 1710        |
| IndexedDirectProductAbelianGroup (IDPAG) . . . . .                                    | 1712        |
| domain IDPAM IndexedDirectProductAbelianMonoid . . . . .                              | 1715        |
| IndexedDirectProductAbelianMonoid (IDPAM) . . . . .                                   | 1716        |
| domain IDPO IndexedDirectProductObject . . . . .                                      | 1720        |
| IndexedDirectProductObject (IDPO) . . . . .   | 1721        |
| domain IDPOAM IndexedDirectProductOrderedAbelianMonoid . . . . .                      | 1723        |
| IndexedDirectProductOrderedAbelianMonoid (IDPOAM) . . . . .                           | 1725        |
| domain IDPOAMS IndexedDirectProductOrderedAbelianMonoidSup . . . . .                  | 1726        |
| IndexedDirectProductOrderedAbelianMonoidSup (IDPOAMS) . . . . .                       | 1728        |
| domain INDE IndexedExponents . . . . .  | 1730        |
| IndexedExponents (INDE) . . . . .   | 1731        |
| domain IFARRAY IndexedFlexibleArray . . . . .   | 1733        |
| IndexedFlexibleArray (IFARRAY) . . . . .  | 1736        |
| domain ILIST IndexedList . . . . .  | 1745        |
| IndexedList (ILIST) . . . . .   | 1748        |
| domain IMATRIX IndexedMatrix . . . . .  | 1757        |
| IndexedMatrix (IMATRIX) . . . . .   | 1759        |
| domain IARRAY1 IndexedOneDimensionalArray . . . . .                                   | 1762        |
| IndexedOneDimensionalArray (IARRAY1) . . . . .  | 1765        |
| domain ISTRING IndexedString . . . . .  | 1769        |
| IndexedString (ISTRING) . . . . .   | 1772        |
| domain IARRAY2 IndexedTwoDimensionalArray . . . . .                                   | 1781        |
| IndexedTwoDimensionalArray (IARRAY2) . . . . .  | 1783        |
| domain IVECTOR IndexedVector . . . . .  | 1784        |
| IndexedVector (IVECTOR) . . . . .   | 1787        |
| domain ITUPLE InfiniteTuple . . . . .   | 1788        |
| InfiniteTuple (ITUPLE) . . . . .  | 1789        |
| domain INFCLSPT InfinitelyClosePoint . . . . .  | 1791        |
| InfinitelyClosePoint (INFCLSPT) . . . . .   | 1792        |
| domain INFCLSPS InfinitelyClosePointOverPseudoAlgebraicClosureOffiniteField . . . . . | 1799        |
| InfinitelyClosePointOverPseudoAlgebraicClosureOffiniteField (INFCLSPS) . . . . .      | 1800        |
| domain IAN InnerAlgebraicNumber . . . . .   | 1802        |
| InnerAlgebraicNumber (IAN) . . . . .  | 1804        |
| domain IFF InnerFiniteField . . . . .   | 1811        |
| InnerFiniteField (IFF) . . . . .  | 1813        |
| domain IFAMON InnerFreeAbelianMonoid . . . . .  | 1815        |
| InnerFreeAbelianMonoid (IFAMON) . . . . .   | 1816        |
| domain IIARRAY2 InnerIndexedTwoDimensionalArray . . . . .                             | 1819        |

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| InnerIndexedTwoDimensionalArray (IIARRAY2) . . . . .    | 1821 |
| domain IPADIC InnerPAdicInteger . . . . .               | 1825 |
| InnerPAdicInteger (IPADIC) . . . . .                    | 1826 |
| domain IPF InnerPrimeField . . . . .                    | 1836 |
| InnerPrimeField (IPF) . . . . .                         | 1839 |
| domain ISUPS InnerSparseUnivariatePowerSeries . . . . . | 1847 |
| InnerSparseUnivariatePowerSeries (ISUPS) . . . . .      | 1850 |
| domain INTABL InnerTable . . . . .                      | 1890 |
| InnerTable (INTABL) . . . . .                           | 1892 |
| domain ITAYLOR InnerTaylorSeries . . . . .              | 1894 |
| InnerTaylorSeries (ITAYLOR) . . . . .                   | 1895 |
| domain INFORM InputForm . . . . .                       | 1901 |
| InputForm (INFORM) . . . . .                            | 1902 |
| domain INT Integer . . . . .                            | 1909 |
| Integer (INT) . . . . .                                 | 1923 |
| domain ZMOD IntegerMod . . . . .                        | 1935 |
| IntegerMod (ZMOD) . . . . .                             | 1936 |
| domain INTFTBL IntegrationFunctionsTable . . . . .      | 1942 |
| IntegrationFunctionsTable (INTFTBL) . . . . .           | 1943 |
| domain IR IntegrationResult . . . . .                   | 1948 |
| IntegrationResult (IR) . . . . .                        | 1949 |
| domain INTRVL Interval . . . . .                        | 1956 |
| Interval (INTRVL) . . . . .                             | 1961 |

## 11 Chapter J 1979

## 12 Chapter K 1981

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| domain KERNEL Kernel . . . . .          | 1981 |
| Kernel (KERNEL) . . . . .               | 1987 |
| domain KAFILe KeyedAccessFile . . . . . | 1993 |
| KeyedAccessFile (KAFILe) . . . . .      | 2000 |

## 13 Chapter L 2007

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| domain LAUPOL LaurentPolynomial . . . . .                  | 2007 |
| LaurentPolynomial (LAUPOL) . . . . .                       | 2009 |
| domain LIB Library . . . . .                               | 2017 |
| Library (LIB) . . . . .                                    | 2021 |
| domain LEXP LieExponentials . . . . .                      | 2023 |
| LieExponentials (LEXp) . . . . .                           | 2028 |
| domain LPOLY LiePolynomial . . . . .                       | 2032 |
| LiePolynomial (LPOLY) . . . . .                            | 2041 |
| domain LSQM LieSquareMatrix . . . . .                      | 2048 |
| LieSquareMatrix (LSQM) . . . . .                           | 2052 |
| domain LODO LinearOrdinaryDifferentialOperator . . . . .   | 2056 |
| LinearOrdinaryDifferentialOperator (LODO) . . . . .        | 2067 |
| domain LODO1 LinearOrdinaryDifferentialOperator1 . . . . . | 2069 |

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| domain LODO2 LinearOrdinaryDifferentialOperator2 | 2079        |
| LinearOrdinaryDifferentialOperator2 (LODO2)      | 2090        |
| domain LIST List                                 | 2092        |
| List (LIST)                                      | 2105        |
| domain LMOPS ListMonoidOps                       | 2111        |
| ListMonoidOps (LMOPS)                            | 2112        |
| domain LMDICT ListMultiDictionary                | 2119        |
| ListMultiDictionary (LMDICT)                     | 2120        |
| domain LA LocalAlgebra                           | 2127        |
| LocalAlgebra (LA)                                | 2128        |
| domain LO Localize                               | 2130        |
| Localize (LO)                                    | 2131        |
| domain LWORD LyndonWord                          | 2135        |
| LyndonWord (LWORD)                               | 2142        |
| <b>14 Chapter M</b>                              | <b>2149</b> |
| domain MCMPLX MachineComplex                     | 2149        |
| MachineComplex (MCMPLX)                          | 2153        |
| domain MFLOAT MachineFloat                       | 2156        |
| MachineFloat (MFLOAT)                            | 2158        |
| domain MINT MachineInteger                       | 2170        |
| MachineInteger (MINT)                            | 2173        |
| domain MAGMA Magma                               | 2175        |
| Magma (MAGMA)                                    | 2182        |
| domain MKCHSET MakeCachableSet                   | 2187        |
| MakeCachableSet (MKCHSET)                        | 2188        |
| domain MMLFORM MathMLFormat                      | 2190        |
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| )set output mathml on                            | 2193        |
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| File src/algebra/Makefile.pamphlet               | 2194        |
| File src/algebra/exposed.lsp.pamphlet            | 2194        |
| File src/algebra/Lattice.pamphlet                | 2194        |
| File src/doc/axiom.bib.pamphlet                  | 2195        |
| File interp/i-output.boot.pamphlet               | 2195        |
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| Private Function Definitions                     | 2201        |
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| domain MATRIX Matrix . . . . .                | 2235 |
| Matrix (MATRIX) . . . . .                     | 2254 |
| domain MODMON ModMonic . . . . .              | 2259 |
| ModMonic (MODMON) . . . . .                   | 2263 |
| domain MODFIELD ModularField . . . . .        | 2272 |
| ModularField (MODFIELD) . . . . .             | 2273 |
| domain MODRING ModularRing . . . . .          | 2275 |
| ModularRing (MODRING) . . . . .               | 2276 |
| domain MODMONOM ModuleMonomial . . . . .      | 2280 |
| ModuleMonomial (MODMONOM) . . . . .           | 2281 |
| domain MODOP ModuleOperator . . . . .         | 2283 |
| ModuleOperator (MODOP) . . . . .              | 2285 |
| domain MOEBIUS MoebiusTransform . . . . .     | 2294 |
| MoebiusTransform (MOEBIUS) . . . . .          | 2295 |
| domain MRING MonoidRing . . . . .             | 2300 |
| MonoidRing (MRING) . . . . .                  | 2301 |
| domain MSET Multiset . . . . .                | 2315 |
| Multiset (MSET) . . . . .                     | 2320 |
| domain MPOLY MultivariatePolynomial . . . . . | 2332 |
| MultivariatePolynomial (MPOLY) . . . . .      | 2339 |
| domain MYEXPR MyExpression . . . . .          | 2340 |
| MyExpression (MYEXPR) . . . . .               | 2344 |
| domain MYUP MyUnivariatePolynomial . . . . .  | 2347 |
| MyUnivariatePolynomial (MYUP) . . . . .       | 2351 |

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|  |      |
|--|------|
| domain NSDPS NeitherSparseOrDensePowerSeries . . . . . | 2355 |
| NeitherSparseOrDensePowerSeries (NSDPS) . . . . .      | 2359 |
| domain NSMP NewSparseMultivariatePolynomial . . . . .  | 2370 |
| NewSparseMultivariatePolynomial (NSMP) . . . . .       | 2374 |
| domain NSUP NewSparseUnivariatePolynomial . . . . .    | 2391 |
| NewSparseUnivariatePolynomial (NSUP) . . . . .         | 2395 |
| domain NONE None . . . . .                             | 2406 |
| None (NONE) . . . . .                                  | 2408 |
| domain NNI NonNegativeInteger . . . . .                | 2409 |
| NonNegativeInteger (NNI) . . . . .                     | 2411 |
| domain NOTTING NottinghamGroup . . . . .               | 2414 |
| NottinghamGroup (NOTTING) . . . . .                    | 2417 |
| domain NIPROB NumericalIntegrationProblem . . . . .    | 2418 |
| NumericalIntegrationProblem (NIPROB) . . . . .         | 2420 |
| domain ODEPROB NumericalODEProblem . . . . .           | 2422 |
| NumericalODEProblem (ODEPROB) . . . . .                | 2424 |
| domain OPTPROB NumericalOptimizationProblem . . . . .  | 2426 |
| NumericalOptimizationProblem (OPTPROB) . . . . .       | 2427 |
| domain PDEPROB NumericalPDEProblem . . . . .           | 2430 |
| NumericalPDEProblem (PDEPROB) . . . . .                | 2431 |

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| <b>16 Chapter O</b>                                   | <b>2435</b> |
| domain OCT Octonion . . . . .                         | 2435        |
| Octonion (OCT) . . . . .                              | 2442        |
| domain ODEIFTBL ODEIntensityFunctionsTable . . . . .  | 2445        |
| ODEIntensityFunctionsTable (ODEIFTBL) . . . . .       | 2446        |
| domain ARRAY1 OneDimensionalArray . . . . .           | 2450        |
| OneDimensionalArray (ARRAY1) . . . . .                | 2454        |
| domain ONECOMP OnePointCompletion . . . . .           | 2456        |
| OnePointCompletion (ONECOMP) . . . . .                | 2458        |
| domain OMCONN OpenMathConnection . . . . .            | 2463        |
| OpenMathConnection (OMCONN) . . . . .                 | 2464        |
| domain OMDEV OpenMathDevice . . . . .                 | 2466        |
| OpenMathDevice (OMDEV) . . . . .                      | 2467        |
| domain OMENC OpenMathEncoding . . . . .               | 2475        |
| OpenMathEncoding (OMENC) . . . . .                    | 2476        |
| domain OMERR OpenMathError . . . . .                  | 2478        |
| OpenMathError (OMERR) . . . . .                       | 2479        |
| domain OMERRK OpenMathErrorKind . . . . .             | 2481        |
| OpenMathErrorKind (OMERRK) . . . . .                  | 2483        |
| domain OP Operator . . . . .                          | 2485        |
| Operator (OP) . . . . .                               | 2493        |
| domain OMLO OppositeMonogenicLinearOperator . . . . . | 2494        |
| OppositeMonogenicLinearOperator (OMLO) . . . . .      | 2496        |
| domain ORDCOMP OrderedCompletion . . . . .            | 2498        |
| OrderedCompletion (ORDCOMP) . . . . .                 | 2499        |
| domain ODP OrderedDirectProduct . . . . .             | 2505        |
| OrderedDirectProduct (ODP) . . . . .                  | 2511        |
| domain OFMONOID OrderedFreeMonoid . . . . .           | 2513        |
| OrderedFreeMonoid (OFMONOID) . . . . .                | 2523        |
| domain OVAR OrderedVariableList . . . . .             | 2530        |
| OrderedVariableList (OVAR) . . . . .                  | 2533        |
| domain ODPOL OrderlyDifferentialPolynomial . . . . .  | 2535        |
| OrderlyDifferentialPolynomial (ODPOL) . . . . .       | 2551        |
| domain ODVAR OrderlyDifferentialVariable . . . . .    | 2553        |
| OrderlyDifferentialVariable (ODVAR) . . . . .         | 2554        |
| domain ODR OrdinaryDifferentialRing . . . . .         | 2556        |
| OrdinaryDifferentialRing (ODR) . . . . .              | 2558        |
| domain OWP OrdinaryWeightedPolynomials . . . . .      | 2560        |
| OrdinaryWeightedPolynomials (OWP) . . . . .           | 2561        |
| domain OSI OrdSetInts . . . . .                       | 2563        |
| OrdSetInts (OSI) . . . . .                            | 2564        |
| domain OUTFORM OutputForm . . . . .                   | 2566        |
| OutputForm (OUTFORM) . . . . .                        | 2568        |



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| <b>17 Chapter P</b>  | <b>2589</b> |
| domain PADIC PAdicInteger . . . . .                                      | 2589        |
| PAdicInteger (PADIC) . . . . .   | 2591        |
| domain PADICRAT PAdicRational . . . . .                                  | 2592        |
| PAdicRational (PADICRAT) . . . . .                                       | 2595        |
| domain PADICRC PAdicRationalConstructor . . . . .                        | 2597        |
| PAdicRationalConstructor (PADICRC) . . . . .                             | 2600        |
| domain PALETTE Palette . . . . .   | 2607        |
| Palette (PALETTE) . . . . .  | 2609        |
| domain PARPCURV ParametricPlaneCurve . . . . .                           | 2611        |
| ParametricPlaneCurve (PARPCURV) . . . . .                                | 2612        |
| domain PARSCURV ParametricSpaceCurve . . . . .                           | 2614        |
| ParametricSpaceCurve (PARSCURV) . . . . .                                | 2615        |
| domain PARSURF ParametricSurface . . . . .                               | 2616        |
| ParametricSurface (PARSURF) . . . . .                                    | 2618        |
| domain PFR PartialFraction . . . . .                                     | 2619        |
| PartialFraction (PFR) . . . . .  | 2628        |
| domain PRITITION Partition . . . . .                                     | 2641        |
| Partition (PRITITION) . . . . .  | 2642        |
| domain PATTERN Pattern . . . . .   | 2647        |
| Pattern (PATTERN) . . . . .  | 2648        |
| domain PATLRES PatternMatchListResult . . . . .                          | 2663        |
| PatternMatchListResult (PATLRES) . . . . .                               | 2665        |
| domain PATRES PatternMatchResult . . . . .                               | 2667        |
| PatternMatchResult (PATRES) . . . . .                                    | 2668        |
| domain PENDTREE PendantTree . . . . .                                    | 2673        |
| PendantTree (PENDTREE) . . . . .   | 2674        |
| domain PERM Permutation . . . . .  | 2677        |
| Permutation (PERM) . . . . .   | 2681        |
| domain PERMGRP PermutationGroup . . . . .                                | 2695        |
| Introduction by Martin Baker . . . . .                                   | 2695        |
| History . . . . .  | 2695        |
| Scaling Up . . . . .   | 2695        |
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| Stabilizers as Subgroups . . . . .                                       | 2700        |
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| Example 2 - Symmetric Group 4 . . . . .                                  | 2709        |
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| Example 4 - Direct Product . . . . .                                     | 2712        |
| Local function: orbitWithSvc . . . . .                                   | 2713        |
| Local function CosetRep1 . . . . .                                       | 2717        |

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| Local function strip1 . . . . .  | 2719 |
| Local function bsgs . . . . .  | 2720 |
| Local function bsgs1 . . . . .   | 2721 |
| PermutationGroup (PERMGRP) . . . . .   | 2749 |
| domain HACKPI Pi . . . . .   | 2789 |
| Pi (HACKPI) . . . . .  | 2791 |
| domain ACPLT PlaneAlgebraicCurvePlot . . . . .                                   | 2794 |
| PlaneAlgebraicCurvePlot (ACPLT) . . . . .  | 2806 |
| domain PLACES Places . . . . .   | 2850 |
| Places (PLACES) . . . . .  | 2852 |
| domain PLACESPS PlacesOverPseudoAlgebraicClosureOfFiniteField . . . . .          | 2853 |
| PlacesOverPseudoAlgebraicClosureOfFiniteField (PLACESPS) . . . . .               | 2854 |
| domain PLCS Plcs . . . . .   | 2855 |
| Plcs (PLCS) . . . . .  | 2856 |
| domain PLOT Plot . . . . .   | 2862 |
| Plot (PLOT) . . . . .  | 2865 |
| domain PLOT3D Plot3D . . . . .   | 2885 |
| Plot3D (PLOT3D) . . . . .  | 2886 |
| domain PBWLB PoincareBirkhoffWittLyndonBasis . . . . .                           | 2904 |
| PoincareBirkhoffWittLyndonBasis (PBWLB) . . . . .                                | 2905 |
| domain POINT Point . . . . .   | 2909 |
| Point (POINT) . . . . .  | 2912 |
| domain POLY Polynomial . . . . .   | 2914 |
| Polynomial (POLY) . . . . .  | 2931 |
| domain IDEAL PolynomialIdeals . . . . .  | 2934 |
| PolynomialIdeals (IDEAL) . . . . .   | 2935 |
| domain PR PolynomialRing . . . . .   | 2950 |
| PolynomialRing (PR) . . . . .  | 2952 |
| domain PI PositiveInteger . . . . .  | 2964 |
| PositiveInteger (PI) . . . . .   | 2965 |
| domain PF PrimeField . . . . .   | 2966 |
| PrimeField (PF) . . . . .  | 2970 |
| domain PRIMARR PrimitiveArray . . . . .  | 2972 |
| PrimitiveArray (PRIMARR) . . . . .   | 2974 |
| domain PRODUCT Product . . . . .   | 2977 |
| Product (PRODUCT) . . . . .  | 2980 |
| domain PROJPL ProjectivePlane . . . . .  | 2984 |
| ProjectivePlane (PROJPL) . . . . .   | 2986 |
| domain PROJPLPS ProjectivePlaneOverPseudoAlgebraicClosureOfFiniteField . . . . . | 2987 |
| ProjectivePlaneOverPseudoAlgebraicClosureOfFiniteField (PROJPLPS) . . . . .      | 2988 |
| domain PROJSP ProjectiveSpace . . . . .  | 2989 |
| ProjectiveSpace (PROJSP) . . . . .   | 2990 |
| domain PACEXT PseudoAlgebraicClosureOfAlgExtOfRationalNumber . . . . .           | 2996 |
| PseudoAlgebraicClosureOfAlgExtOfRationalNumber (PACEXT) . . . . .                | 2998 |
| domain PACOFF PseudoAlgebraicClosureOfFiniteField . . . . .                      | 3010 |
| PseudoAlgebraicClosureOfFiniteField (PACOFF) . . . . .                           | 3013 |

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| domain PACRAT PseudoAlgebraicClosureOfRationalNumber . . . . . | 3027 |
| PseudoAlgebraicClosureOfRationalNumber (PACRAT) . . . . .      | 3029 |

## 18 Chapter Q 3043

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| domain QFORM QuadraticForm . . . . .       | 3043 |
| QuadraticForm (QFORM) . . . . .            | 3044 |
| domain QALGSET QuasiAlgebraicSet . . . . . | 3046 |
| QuasiAlgebraicSet (QALGSET) . . . . .      | 3047 |
| domain QUAT Quaternion . . . . .           | 3054 |
| Quaternion (QUAT) . . . . .                | 3060 |
| domain QEQUAT QueryEquation . . . . .      | 3062 |
| QueryEquation (QEQUAT) . . . . .           | 3063 |
| domain QUEUE Queue . . . . .               | 3064 |
| Queue (QUEUE) . . . . .                    | 3077 |

## 19 Chapter R 3085

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| domain RADFF RadicalFunctionField . . . . .                  | 3085 |
| RadicalFunctionField (RADFF) . . . . .                       | 3089 |
| domain RADIX RadixExpansion . . . . .                        | 3098 |
| RadixExpansion (RADIX) . . . . .                             | 3106 |
| domain RECLOS RealClosure . . . . .                          | 3117 |
| RealClosure (RECLOS) . . . . .                               | 3142 |
| domain RMATRIX RectangularMatrix . . . . .                   | 3153 |
| RectangularMatrix (RMATRIX) . . . . .                        | 3155 |
| domain REF Reference . . . . .                               | 3159 |
| Reference (REF) . . . . .                                    | 3160 |
| domain RGCHAIN RegularChain . . . . .                        | 3162 |
| RegularChain (RGCHAIN) . . . . .                             | 3165 |
| domain REGSET RegularTriangularSet . . . . .                 | 3168 |
| RegularTriangularSet (REGSET) . . . . .                      | 3195 |
| domain RESRING ResidueRing . . . . .                         | 3212 |
| ResidueRing (RESRING) . . . . .                              | 3213 |
| domain RESULT Result . . . . .                               | 3216 |
| Result (RESULT) . . . . .                                    | 3218 |
| domain RULE RewriteRule . . . . .                            | 3221 |
| RewriteRule (RULE) . . . . .                                 | 3223 |
| domain ROIRC RightOpenIntervalRootCharacterization . . . . . | 3229 |
| RightOpenIntervalRootCharacterization (ROIRC) . . . . .      | 3230 |
| domain ROMAN RomanNumeral . . . . .                          | 3247 |
| RomanNumeral (ROMAN) . . . . .                               | 3254 |
| domain ROUTINE RoutinesTable . . . . .                       | 3256 |
| RoutinesTable (ROUTINE) . . . . .                            | 3259 |
| domain RULECOLD RuleCalled . . . . .                         | 3276 |
| RuleCalled (RULECOLD) . . . . .                              | 3277 |
| domain RULESET Ruleset . . . . .                             | 3278 |
| Ruleset (RULESET) . . . . .                                  | 3279 |

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| <b>20 Chapter S</b>   | <b>3283</b> |
| domain FORMULA ScriptFormulaFormat . . . . .                  | 3283        |
| ScriptFormulaFormat (FORMULA) . . . . .                       | 3284        |
| domain SEG Segment . . . . .                                  | 3299        |
| Segment (SEG) . . . . .                                       | 3303        |
| domain SEGBIND SegmentBinding . . . . .                       | 3307        |
| SegmentBinding (SEGBIND) . . . . .                            | 3310        |
| domain SET Set . . . . .                                      | 3311        |
| Set (SET) . . . . .   | 3319        |
| domain SETMN SetOfMIntegersInOneToN . . . . .                 | 3326        |
| SetOfMIntegersInOneToN (SETMN) . . . . .                      | 3328        |
| domain SDPOL SequentialDifferentialPolynomial . . . . .       | 3334        |
| SequentialDifferentialPolynomial (SDPOL) . . . . .            | 3337        |
| domain SDVAR SequentialDifferentialVariable . . . . .         | 3339        |
| SequentialDifferentialVariable (SDVAR) . . . . .              | 3341        |
| domain SEX SExpression . . . . .                              | 3343        |
| SExpression (SEX) . . . . .                                   | 3344        |
| domain SEXOF SExpressionOf . . . . .                          | 3345        |
| SExpressionOf (SEXOF) . . . . .                               | 3346        |
| domain SAE SimpleAlgebraicExtension . . . . .                 | 3350        |
| SimpleAlgebraicExtension (SAE) . . . . .                      | 3353        |
| domain SCELL SimpleCell . . . . .                             | 3362        |
| SimpleCell (SCELL) . . . . .                                  | 3363        |
| domain SFORT SimpleFortranProgram . . . . .                   | 3367        |
| SimpleFortranProgram (SFORT) . . . . .                        | 3368        |
| domain SINT SingleInteger . . . . .                           | 3371        |
| SingleInteger (SINT) . . . . .                                | 3376        |
| domain SAOS SingletonAsOrderedSet . . . . .                   | 3386        |
| SingletonAsOrderedSet (SAOS) . . . . .                        | 3387        |
| domain SEM SparseEchelonMatrix . . . . .                      | 3389        |
| SparseEchelonMatrix (SEM) . . . . .                           | 3390        |
| domain SMP SparseMultivariatePolynomial . . . . .             | 3417        |
| SparseMultivariatePolynomial (SMP) . . . . .                  | 3420        |
| domain SMTS SparseMultivariateTaylorSeries . . . . .          | 3443        |
| SparseMultivariateTaylorSeries (SMTS) . . . . .               | 3450        |
| domain STBL SparseTable . . . . .                             | 3465        |
| SparseTable (STBL) . . . . .                                  | 3469        |
| domain SULS SparseUnivariateLaurentSeries . . . . .           | 3470        |
| SparseUnivariateLaurentSeries (SULS) . . . . .                | 3474        |
| domain SUP SparseUnivariatePolynomial . . . . .               | 3484        |
| SparseUnivariatePolynomial (SUP) . . . . .                    | 3489        |
| domain SUEXPR SparseUnivariatePolynomialExpressions . . . . . | 3504        |
| SparseUnivariatePolynomialExpressions (SUEXPR) . . . . .      | 3508        |
| domain SUPXS SparseUnivariatePuisseuxSeries . . . . .         | 3512        |
| SparseUnivariatePuisseuxSeries (SUPXS) . . . . .              | 3515        |
| domain ORESUP SparseUnivariateSkewPolynomial . . . . .        | 3519        |

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| SparseUnivariateSkewPolynomial (ORESUP) . . . . .       | 3521 |
| domain SUTS SparseUnivariateTaylorSeries . . . . .      | 3523 |
| SparseUnivariateTaylorSeries (SUTS) . . . . .           | 3526 |
| domain SHDP SplitHomogeneousDirectProduct . . . . .     | 3543 |
| SplitHomogeneousDirectProduct (SHDP) . . . . .          | 3546 |
| domain SPLNODE SplittingNode . . . . .                  | 3548 |
| SplittingNode (SPLNODE) . . . . .                       | 3549 |
| domain SPLTREE SplittingTree . . . . .                  | 3555 |
| SplittingTree (SPLTREE) . . . . .                       | 3557 |
| domain SREGSET SquareFreeRegularTriangularSet . . . . . | 3569 |
| SquareFreeRegularTriangularSet (SREGSET) . . . . .      | 3580 |
| domain SQMATRIX SquareMatrix . . . . .                  | 3597 |
| SquareMatrix (SQMATRIX) . . . . .                       | 3602 |
| domain STACK Stack . . . . .                            | 3608 |
| Stack (STACK) . . . . .                                 | 3619 |
| domain SD StochasticDifferential . . . . .              | 3625 |
| StochasticDifferential (SD) . . . . .                   | 3630 |
| domain STREAM Stream . . . . .                          | 3638 |
| Stream (STREAM) . . . . .                               | 3644 |
| domain STRING String . . . . .                          | 3666 |
| String (STRING) . . . . .                               | 3678 |
| domain STRTBL StringTable . . . . .                     | 3681 |
| StringTable (STRTBL) . . . . .                          | 3684 |
| domain SUBSPACE SubSpace . . . . .                      | 3685 |
| SubSpace (SUBSPACE) . . . . .                           | 3687 |
| domain COMPPROP SubSpaceComponentProperty . . . . .     | 3703 |
| SubSpaceComponentProperty (COMPPROP) . . . . .          | 3704 |
| domain SUCH SuchThat . . . . .                          | 3706 |
| SuchThat (SUCH) . . . . .                               | 3707 |
| domain SWITCH Switch . . . . .                          | 3709 |
| Switch (SWITCH) . . . . .                               | 3710 |
| domain SYMBOL Symbol . . . . .                          | 3714 |
| Symbol (SYMBOL) . . . . .                               | 3722 |
| domain SYMTAB SymbolTable . . . . .                     | 3736 |
| SymbolTable (SYMTAB) . . . . .                          | 3737 |
| domain SYMPOLY SymmetricPolynomial . . . . .            | 3744 |
| SymmetricPolynomial (SYMPOLY) . . . . .                 | 3745 |

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| domain TABLE Table . . . . .     | 3749 |
| Table (TABLE) . . . . .          | 3756 |
| domain TABLEAU Tableau . . . . . | 3758 |
| Tableau (TABLEAU) . . . . .      | 3759 |
| domain TS TaylorSeries . . . . . | 3761 |
| TaylorSeries (TS) . . . . .      | 3764 |
| domain TEX TexFormat . . . . .   | 3766 |

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|---|-------------|
| product(product(i*j,i=a..b),j=c..d) fix                           | 3766        |
| TexFormat (TEX)   | 3770        |
| domain TEXTFILE TextFile  | 3790        |
| TextFile (TEXTFILE)   | 3794        |
| domain SYMS TheSymbolTable  | 3798        |
| TheSymbolTable (SYMS)   | 3799        |
| domain M3D ThreeDimensionalMatrix                                 | 3806        |
| ThreeDimensionalMatrix (M3D)                                      | 3808        |
| domain VIEW3D ThreeDimensionalViewport                            | 3817        |
| ThreeDimensionalViewport (VIEW3D)                                 | 3819        |
| domain SPACE3 ThreeSpace  | 3850        |
| ThreeSpace (SPACE3)   | 3852        |
| domain TREE Tree  | 3867        |
| Tree (TREE)   | 3869        |
| domain TUBE TubePlot  | 3883        |
| TubePlot (TUBE)   | 3884        |
| domain TUPLE Tuple  | 3886        |
| Tuple (TUPLE)   | 3887        |
| domain ARRAY2 TwoDimensionalArray                                 | 3889        |
| TwoDimensionalArray (ARRAY2)                                      | 3899        |
| domain VIEW2D TwoDimensionalViewport                              | 3900        |
| TwoDimensionalViewport (VIEW2D)                                   | 3906        |
| <b>22 Chapter U</b>   | <b>3929</b> |
| domain UFPS UnivariateFormalPowerSeries                           | 3929        |
| UnivariateFormalPowerSeries (UFPS)                                | 3932        |
| domain ULS UnivariateLaurentSeries                                | 3933        |
| UnivariateLaurentSeries (ULS)                                     | 3939        |
| domain ULSCONS UnivariateLaurentSeriesConstructor                 | 3942        |
| UnivariateLaurentSeriesConstructor (ULSCONS)                      | 3947        |
| domain UP UnivariatePolynomial                                    | 3967        |
| UnivariatePolynomial (UP)   | 3983        |
| domain UPXS UnivariatePuisseuxSeries                              | 3986        |
| UnivariatePuisseuxSeries (UPXS)                                   | 3989        |
| domain UPXSCONS UnivariatePuisseuxSeriesConstructor               | 3995        |
| UnivariatePuisseuxSeriesConstructor (UPXSCONS)                    | 3999        |
| domain UPXSING UnivariatePuisseuxSeriesWithExponentialSingularity | 4014        |
| UnivariatePuisseuxSeriesWithExponentialSingularity (UPXSING)      | 4016        |
| domain OREUP UnivariateSkewPolynomial                             | 4027        |
| UnivariateSkewPolynomial (OREUP)                                  | 4039        |
| domain UTS UnivariateTaylorSeries                                 | 4041        |
| UnivariateTaylorSeries (UTS)                                      | 4044        |
| domain UTSZ UnivariateTaylorSeriesCZero                           | 4056        |
| UnivariateTaylorSeriesCZero (UTSZ)                                | 4059        |
| domain UNISEG UniversalSegment                                    | 4070        |
| UniversalSegment (UNISEG)   | 4073        |

|  |             |
|--|-------------|
| domain U8MAT U8Matrix . . . . .                | 4078        |
| U8Matrix (U8MAT) . . . . .                     | 4081        |
| domain U16MAT U16Matrix . . . . .              | 4084        |
| U16Matrix (U16MAT) . . . . .                   | 4086        |
| domain U32MAT U32Matrix . . . . .              | 4089        |
| U32Matrix (U32MAT) . . . . .                   | 4092        |
| domain U8VEC U8Vector . . . . .                | 4095        |
| U8Vector (U8VEC) . . . . .                     | 4099        |
| domain U16VEC U16Vector . . . . .              | 4102        |
| U16Vector (U16VEC) . . . . .                   | 4107        |
| domain U32VEC U32Vector . . . . .              | 4110        |
| U32Vector (U32VEC) . . . . .                   | 4115        |
| <b>23 Chapter V</b>                            | <b>4119</b> |
| domain VARIABLE Variable . . . . .             | 4119        |
| Variable (VARIABLE) . . . . .                  | 4120        |
| domain VECTOR Vector . . . . .                 | 4121        |
| Vector (VECTOR) . . . . .                      | 4127        |
| domain VOID Void . . . . .                     | 4129        |
| Void (VOID) . . . . .                          | 4131        |
| <b>24 Chapter W</b>                            | <b>4133</b> |
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| 85.1.3 | fortran code     | 11451 |
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| 85.2.1 | Axiom unit tests | 11453 |
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| 86.2.4 | lisp code        | 11473 |
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| 86.6   | dptts2           | 11500 |
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| 87.4 spttrf . . . . .   | 11531        |
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