**Number Theory**

Example 1: Find the remainder when *21* is divided by *5.*

$$21 mod 5$$

The command *mod* is recognized and can be used in modulo arithmetic problems. Right-click and select *Calculate* to give the answer:

$$1$$

Example 2: Find the greatest common factor from a list of numbers.

In the free add-in version, *gcf* (not *gcd*) is recognized. Also, *lcm* is a recognized command. Consider the input:

$$gcf 300,145$$

Notice, parentheses are not needed in this syntax, but may be used as shown below.

$$gcf (300,145)$$

Select *Calculate* to yield the answer.

Example 3: Convert the following number that is given in base *10* to a base of *3.*

*35*

The command is *toBase* followed by the desired base and the original base *ten* number. The base should be a number from *2* to *36*. Our example will be:

$$toBase(3,35)$$

From the drop-down menu, select *Calculate*. The result is:

$$1022\_{3}$$

Example 4: Convert a number from another base to base ten.

$$1022\_{3}$$

The recognized command *base* followed with the current base and the current number returns an equivalent number in base *ten*. The original base must be a number between *2* and *36*. Our example will be:

$$base(3,1022)$$

Select *Calculate* to give the number in base *ten*.

$$35$$

Example 5: From a list, find a maximum value.

$$\{2,.3,7,56.22,4\}$$

Right-click and select *Sort* to return the list in ascending order.



The original list is entered as a string using { and }.

$$\left\{0.3, 2, 4, 7, 56.22\right\}$$

The answer is *56.22.*



Alternatively, *Calculate Statistic* with the pull-out option of *Maximum* will give the answer.

Example 6: Given a number, find the closest prime to the right of it.

$$104$$

The command is *nextPrime.* The input will be:

$$nextPrime(104)$$

Right-click and select *Calculate* to give:

$$107$$

The command *PrevPrime* will find the prime closest to the left of the given integer.

$$PrevPrime(104)$$

Right-click and select *Calculate* to give:

$$103$$

Example 7: Determine if a given number is a prime number.

$$107$$

The command is *IsPrime.* The input will be:

$$IsPrime(107)$$

Select *Calculate* to find:

$$true$$

Example 8: Given a set of numbers, find the geometric mean.

$$14,5,2$$

Given *n* numbers, the *nth* root of the product of the numbers is called the geometric mean. For our example, the input will be:

$$geometricMean(14,5,2)$$

The option *Calculate* gives the answer:

$$\sqrt[3]{140}$$

Example 9: Given two numbers, find the harmonic mean.

$$2,3$$

Given *n* numbers, *n* divided by the sum of the reciprocal of the original numbers is called the harmonic mean. For our example, $(2/(\frac{1}{2}+\frac{1}{3})$ gives *12/5.* To find, use the command, *harmonicMean*. The input for our example is:

$$harmonicMean(2,3)$$

The option *Calculate* gives:

$$\frac{12}{5}$$

Example 10: Give the prime factorization for a given integer.

$$2200$$

The option *factor* will provide the prime factorization. The input will be:

$$factor(2200)$$

Right-click and select *Calculate* to get:

$$2^{3}·5^{2}·11$$