Problem 1

If we list all the natural numbers below 10 that are multiples of 3 or 5, we get 3, 5, 6 and 9. The sum of these multiples is 23.

Find the sum of all the multiples of 3 or 5 below 1000.

Solution

This is trivial to do by brute-force in *Mathematica*:

In[17]:=
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Total[Select[Range[999], Divisible[#, 3] || Divisible[#, 5] &]]
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Out[17]= 233 168

Alternatively, by inclusion/exclusion:

In[22]:=
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numDivBy3 = 3 * With[{n = Floor[999 / 3]}, n (n + 1) / 2];
numDivBy5 = 5 * With[{n = Floor[999 / 5]}, n (n + 1) / 2] ;
numDivBy15 = 15 * With[{n = Floor[999 / 15]}, n (n + 1) / 2];

numDivBy3 + numDivBy5 - numDivBy15
```

Out[25]= 233 168