Problem 4

A palindromic number reads the same both ways. The largest palindrome made from the product of two 2-digit numbers is 9009 = 91 × 99.

Find the largest palindrome made from the product of two 3-digit numbers.

Solution

In[73]:=
```
palindromeQ[n_] := With[{digs = IntegerDigits[n]}, digs === Reverse[digs]]
```

By brute-force:

In[74]:=
```
Max@Select[Times @@@ Tuples[Range[100, 999], {2}], palindromeQ] // AbsoluteTiming
```

Out[74]=
```
{6.053081, 906 609}
```

The function Subsets is much faster, but misses out the square numbers:

In[75]:=
```
Max[Join[Select[Times @@@ Subsets[Range[100, 999], {2}], palindromeQ],
   Select[Times @@@ Range[100, 999]^2, palindromeQ]]] // AbsoluteTiming
```

Out[75]=
```
{3.121324, 906 609}
```

We can be more clever, by noting that palindromes must be divisible by 11, so one of the numbers must be divisible by 11.

In[76]:=
```
div11s = Range[110, 999, 11];
```

In[77]:=
```
Max@Select[Times @@@ Tuples[{div11s, Range[100, 999]}], palindromeQ] //
 AbsoluteTiming
```

Out[77]=
```
{0.524841, 906 609}
```