

1. This week's Problem of the Week in Math is described as follows:

*There are thirty positive integers less than 100 that share a certain property. Your friend, Blake, wrote them down in the table to the left. But Blake made a mistake! One of the numbers listed is wrong and should be replaced with another. Which number is incorrect, what should it be replaced with, and why?*

The numbers are listed below.

6	10	14	15	21
22	26	33	34	35
38	39	46	51	55
57	58	62	65	69
75	77	82	85	86
87	91	93	94	95

Use the fact that the “certain” property is that these numbers are all supposed to be the product of *unique* prime numbers to find and fix the mistake that Blake made.

**Reminder:** Code your solution in an R script and copy it over to this `.Rnw` file.

**Hint:** You may find the `%in%` operator and the `setdiff()` function to be helpful.

### Solution:

```
# Copy your solution code here.
#original list
og.list <- c(6,10,14,15,21,22,26,33,34,35,38,39,46,51,55,57,58,62,65,69,75,77,82,85,86,87,91,93,94,95)

#list out prime nums less than 100
primes <- c(2,3,5,7,11,13,17,19,23,29,31,37,41,43,47)

#multiply them by each other, and add to a new vector (length of 30) if <100
toReturn <- numeric(30)
num <- 0
for (i in 1:length(primes)){
  for (j in 1:length(primes)){
    toCheck <-primes[i]*primes[j]
    if (toCheck<100 & !(toCheck%in%toReturn) & i!=j){
      toReturn[num] = toCheck
      num= num+1
    }
  }
}

(toReturn)

## [1] 10 14 22 26 34 38 46 58 62 74 82 86 94 6 15 21 33 39 51 57 69 87 93 35 55
## [26] 65 85 95 77 91

(length(toReturn))

## [1] 30

#check which numbers are different between the two vectors
wrong.num <- setdiff(og.list,toReturn)
missing.num <- setdiff(toReturn, og.list)

(wrong.num)

## [1] 75

(missing.num)

## [1] 74
```

```
#replace wrong number with correct number
index <- which(og.list==wrong.num)
toReturn[index] = missing.num

(index)

## [1] 21

(toReturn)

## [1] 10 14 22 26 34 38 46 58 62 74 82 86 94 6 15 21 33 39 51 57 74 87 93 35 55
## [26] 65 85 95 77 91
```