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: This code effectively solves the problem at hand because it creates a list of the products of all unique prime numbers that are less than 100, and then compares each item in the given list with the created list. When it finds the item in the given list that is not in the created list, it replaces the given value with the created value. This ensures that any objects in the given list that do not satisfy the conditions are removed and replaced (in this case there is only one in the given list, however this algorithm could be applied to a different list with multiple "wrong" values).

```
# 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
```

```r
(missing.num)
```

```
## [1] 74
```

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

(index)
```

```
## [1] 21
```

```r
(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
```