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:

```
#Stores data frame values
initial.vals = c(6, 22, 38, 57, 75, 87, 10, 26, 39, 58, 77, 91, 14, 33, 46, 62, 82, 93, 15, 34, 51, 65, 85, 94,
                 21, 35, 55, 69, 86, 95)
correct.vals = vector(mode = "numeric", length = 0)
#Vector of all prime numbers that can be factors of numbers
#less than 100
prime.numbers = c(2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37,
41, 43, 47)
#Finds every possible product of prime numbers that is less than 100
#Iterates through first factors
for(factor1 in prime.numbers)
{
  #Stores product
  product = 0
  for(factor2 in prime.numbers)
  {
    if(factor1 != factor2)
    {
      #Finds the potential product
      product = factor1*factor2
      #Conditions for the product to be valid
      if(product> 0 && product < 100)
      {
        correct.vals = append(correct.vals, product)
      }
    }
  }
}
#Stores the incorrect number
diff.num = setdiff(initial.vals, correct.vals)
#Stores the correct number
correct.num = setdiff(correct.vals, initial.vals)
answer = paste("Issue fixed: Blake inserted ", diff.num, "instead of ", correct.num)
print(answer)
```

```
## [1] "Issue fixed: Blake inserted  75 instead of  74"
```

```
justification =
("Justification: My code found every possible product of unique prime numbers from 0 to 100. 75 was not included in that
 which means that it cannot be the product of two unique prime numbers. The only number that the intitial list was
 missing was 74 which means that Blake mistakenly replaced it with 75.")
print(justification)
```

```
## [1] "Justification: My code found every possible product of unique prime numbers from 0 to 100. 75 was not included in that \n which mea
```