LHW 1

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2/1/2021

Complete the tasks over at `https://dsollberger.shinyapps.io/Math32LearnR1/`

- take a screenshot of each page of this assignment
- copy and paste the screenshots onto a Word document (or Google Doc or equivalent)
- save as a PDF
- be sure that your name appears on the document
- upload the PDF back to our CatCourses page

Math 32 Learn R Tutorial 1

Be sure to click "Run Code" where applicable.

Let $X = \{1, 2, 3, \ldots, 99, 100\}$.

Inclusion-Exclusion

✓ Sequences

The provided code creates a sequence of natural numbers from 5 to 100 counting by multiples of 5. Create a sequence of natural numbers from 3 to 100 counting by multiples of 3.

```
1  fives  <- seq(5, 100, 5)
2  threes <- seq(3, 100, 3)
3  print(fives)
4  print(threes)
```

```
[1]   5  10  15  20  25  30  35  40  45  50  55  60  65  70  75  80
[17]  85  90  95 100
```

```
[1]   3   6   9  12  15  18  21  24  27  30  33  36  39  42  45  48  51  54  57  60  63  66
[23]  69  72  75  78  81  84  87  90  93  96  99
```

✓ Intersection and Union

The provided code prints the intersection of `fives` and `threes`. Write another line of code that prints the `union` of `fives` and `threes`

```
1  print(intersect(fives, threes))
2  print(" ") # inserting a vertical space in the output
3  print(sort(union(fives, threes)))
```

```
[1] 15 30 45 60 75 90
```

```
[1] " "
```

```
[1]   3   5   6   9  10  12  15  18  20  21  24  25  27  30  33  35
[17]  36  39  40  42  45  48  50  51  54  55  57  60  63  65  66  69
[33]  70  72  75  78  80  81  84  85  87  90  93  95  96  99 100
```

✓ Cardinality

Print the `length` of

- `fives`
- `threes`
- the intersection of `fives` and `threes`
- the union of `fives` and `threes`

```
1  print(length(fives))
2  print(length(threes))
3  print(length(intersect(fives, threes)))
4  print(length(union(fives, threes)))
```

```
[1] 20
```

```
[1] 33
```

```
[1] 6
```

```
[1] 47
```

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Be sure to click "Run Code" where applicable.

Let $X = \{1, 2, 3, \ldots, 99, 100\}$.

Filtering

✓ Example of Tidyverse Filtering

The following code computes the probability that X is a multiple of 3 *given* that X is a multiple of 5.

Code	🔄 Start Over		▶ Run Code

```
1  # X was stored as a data frame called "dfX"
2  dfX %>%
3    filter(x %% 5 == 0) %>%
4    mutate(denominator = n()) %>%
5    filter(x %% 3 == 0) %>%
6    mutate(numerator = n()) %>%
7    mutate(ratio = numerator / denominator) %>%
8    summarize(conditional_prob = unique(ratio))
```

conditional_prob
<dbl>
0.3

1 row

✓ Exercise with Tidyverse Filtering

Compute the probability that X is a multiple of 5 *given* that X is a multiple of 3.

Code	🔄 Start Over		▶ Run Code

```
1  # X was stored as a data frame called "dfX"
2  dfX %>%
3    filter(x %% 3 == 0) %>%
4    mutate(denominator = n()) %>%
5    filter(x %% 5 == 0) %>%
6    mutate(numerator = n()) %>%
7    mutate(ratio = numerator / denominator) %>%
8    summarize(conditional_prob = unique(ratio))
```

conditional_prob
<dbl>
0.1818182

1 row

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Be sure to click "Run Code" where applicable.

Let $X = \{1, 2, 3, \ldots, 99, 100\}$.

Conditional Probability Application

✓ Titanic Data

The `titanic` data set contains data about the Titanic shipwreck ([package documentation](#)). Here is a quick look at the data

PassengerId	Survived	Pclass	Name	Sex	A..
<int>	<int>	<int>	<chr>	<chr>	<dbl>
1	1	0	3 Braund, Mr. Owen Harris	male	22
2	2	1	1 Cumings, Mrs. John Bradley (Florence Briggs Thayer)	female	38
3	3	1	3 Heikkinen, Miss. Laina	female	26
4	4	1	1 Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35
5	5	0	3 Allen, Mr. William Henry	male	35
6	6	0	3 Moran, Mr. James	male	NA

6 rows | 1-7 of 13 columns

✓ Example of Titanic Data Mining

Here we compute the probability that a passenger was under 32 years old *given* that they were a first-class passenger.

Code ⟳ Start Over   ▶ Run Code

```
1  titanic_train %>%
2    filter(Pclass == 1) %>%
3    mutate(denominator = n()) %>%
4    filter(Age < 32) %>%
5    mutate(numerator = n()) %>%
6    mutate(ratio = numerator / denominator) %>%
7    summarize(cond_prob = unique(ratio))
```

cond_prob
<dbl>
0.3055556

1 row

✓ Titanic Exercise 1

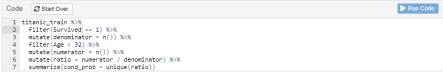Compute the probability that a passenger was over 32 years old *given* that they were a third-class passenger.

Code ⟳ Start Over   ▶ Run Code

```
1  titanic_train %>%
2    filter(Pclass == 3) %>%
3    mutate(denominator = n()) %>%
4    filter(Age > 32) %>%
5    mutate(numerator = n()) %>%
6    mutate(ratio = numerator / denominator) %>%
7    summarize(cond_prob = unique(ratio))
```

cond_prob
<dbl>
0.1670061

1 row

✓ Titanic Exercise 2

Compute the probability that a passenger was under 32 years old *given* that they survived the shipwreck.

Code ⟳ Start Over   ▶ Run Code

```
1  titanic_train %>%
2    filter(Survived == 1) %>%
3    mutate(denominator = n()) %>%
4    filter(Age < 32) %>%
5    mutate(numerator = n()) %>%
6    mutate(ratio = numerator / denominator) %>%
7    summarize(cond_prob = unique(ratio))
```

cond_prob
<dbl>
0.5087719

1 row

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Tutorial

Derek Sollberger

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Be sure to click "Run Code" where applicable.

Let $X = \{1, 2, 3, \ldots, 99, 100\}$.

Wrap Up

Your Full Name

Adrian Darian

Take screenshots of these pages and work (be sure that your name appears) and upload the screenshots back to our CatCourses page as a single file PDF or Word document.

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