

Review

- Lab 5 is now available.
- Remember to take the quiz for assignment 06 after you do Lab 5!
- **String declarations and creations**
 - `String s = "abc";`
 - `String s = new String("abc");`
- `length()`, `indexOf()`
- `equals()`

2D array exercise

- Find the average of each column of the 2D array `int [][] ages`; Store the averages in a oneD array `float [] ageAverages`. The length of `ageAverages` should be the number of columns in `ages`.

More String functions

- `indexOf` used with a substring
 - `String str = "abcdefghi";`
 - `println(str.indexOf("def"));`
 - `println(str.indexOf("bb"));`
- `substring(beginIndex, endIndex)`
 - `beginIndex` is inclusive, `endIndex` is exclusive
 - `String str1 = str.substring(3);`
 - `String str2 = str.substring(3, 6);`

Exercise

- `String msg = "The quick brown fox jumps over the lazy dog."`
- Write code to create substring "fox jumps"
- Write code to create substring "lazy dog"

2-parameter indexOf

- `String s = "a man, a plan, a canal Panama";`
- `int i = s.indexOf("an");`
- `int i = s.indexOf("an", 4);`
- `println(s.indexOf("an", i+1));`

toString

- `toString()` is a method defined to return a `String`, which is meant to be the string representation of an object
- It is what `println` and `print` will use when called on an object
- Every object/class inherits from a superclass `Object` which comes with a `toString()` method
- Overwrite the `toString` to how you want your object printed.

Array of String

- Declarations
 - `String[] strs = new String[10];`
 - `String[] strs = {"ab", "cde", "f"};`
- Write a function that takes an array of strings `strs` and another string `s` and return how many of the strings in the array contain the string `s` as a substring.

split() and splitTokens()

- `String s = "a man, a plan, a canal Panama";`
- `String[] strs = splitTokens(s, ",");`
- `String[] strs = s.split(",");`
- What will be the length of `strs`?
- What will be the value of `strs[1]`?
- Write the expression that gives the number of elements in `strs`.

WHO Tuberculosis data

Tuberculosis (TB)

Download data as CSV files

Data provided by countries to WHO and estimates of TB burden generated by WHO for the Global Tuberculosis Report are available for download as comma-separated value (CSV) files. CSV files can be opened by or imported into many spreadsheet, statistical analysis and database packages.

Data are provided subject to WHO's copyright notice and permissions and licensing rules.

Definition of variables

The first row in each CSV file contains variable names; find the definition of each variable in the data dictionary.

Download the data dictionary [zav 43kb]

WHO TB burden estimates

This includes WHO-generated estimates of TB mortality, prevalence, incidence (including incidence of TB/HIV), case detection rate, proportion of TB cases that have multidrug-resistant TB (MDR-TB) and MDR-TB among notified pulmonary TB cases.

22 March 2016: TB prevalence estimates were updated for Zimbabwe.

Download WHO TB burden estimates [1.1Mb]

<http://www.who.int/tb/country/data/download/en/index.html>

country	iso2	iso3	iso_numeric	e_whoregion	year	e_pop_num	e_prev_100k	e_prev_100k_e_prev_100k	e_prev_100k_e_prev_100k	e_prev_100k_e_prev_100k	e_prev_100k_e_prev_100k	e_prev_100k_e_prev_100k	source_prev_e
Afghanistan	AF	AFG	4	EMR	1990	1267570	189	180	502	17000	10000	61000	
Afghanistan	AF	AFG	4	EMR	1991	12789374	191	180	562	48000	23000	72000	
Afghanistan	AF	AFG	4	EMR	1992	13745630	191	191	613	51000	26000	86000	
Afghanistan	AF	AFG	4	EMR	1993	14824371	189	194	657	58000	29000	97000	
Afghanistan	AF	AFG	4	EMR	1994	15869967	188	198	694	69000	31000	110000	
Afghanistan	AF	AFG	4	EMR	1995	16772522	188	201	731	71000	34000	120000	
Afghanistan	AF	AFG	4	EMR	1996	17481800	188	202	758	76000	35000	130000	
Afghanistan	AF	AFG	4	EMR	1997	18034130	189	204	776	80000	37000	140000	

```
country,year,e_pop_num,e_inc_100k
Afghanistan,1990,12067570,189
Afghanistan,1991,12789374,191
Afghanistan,1992,13745630,191
Afghanistan,1993,14824371,189
Afghanistan,1994,15869967,188
Afghanistan,1995,16772522,188
Afghanistan,1996,17481800,188
Afghanistan,1997,18034130,189
Afghanistan,1998,18511480,189
Afghanistan,1999,19038420,190
Afghanistan,2000,19701940,190
Afghanistan,2001,20531160,189
Afghanistan,2002,21487079,189
Afghanistan,2003,22507368,189
Afghanistan,2004,23499850,189
```

```
// parseFile

String[] data;

void setup() {
  // Load data from a file as array of strings
  data = loadStrings("reduced.csv");

  for (int i=0; i<data.length; i++) {
    println(data[i]);
  }
}
```

```

// parseFile2
String[] data;
Item[] items;
int count = 0;

void setup() {
  // Load data as array of strings
  data = loadStrings("reduced.csv");

  //create object array
  //(length-1) because we throw away line 0
  items = new Item[data.length-1];
  //Fill object array
  for (int i=1; i<data.length; i++) {
    //split each line into pieces on ","
    String[] pieces = data[i].split(",");
    items[i-1] = new Item(pieces[0],
      int(pieces[1]),
      int(pieces[2]),
      int(pieces[3]));
  }

  for (int i=0; i<items.length; i++) {
    println(items[i]);
  }
}

class Item {
  String country; // Country name
  int year; // Year
  int pop; // Population
  int inc; // Incidences of TB
           // per 100,000

  Item(String country, int year, int pop, int inc) {
    this.country = country;
    this.year = year;
    this.pop = pop;
    this.inc = inc;
  }

  String toString() {
    String msg = "In " + year + ", " + country;
    msg += " had population " + pop;
    msg += " and TB incidences per 100k of " + inc;
    return(msg);
  }
}

```

GapMinder
<http://www.gapminder.org>
<http://www.gapminder.org/videos/hans-rosling-on-cnn-us-in-a-converging-world/>

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