

# Assignments

CS 413: Software Systems Laboratory

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## LaTeX<sup>1</sup>

Create a LaTeX document (of `article` type), including the following aspects.

- Table of contents
- List of figures
- List of tables
- Title
- Author
- Affiliation
- Email
- Date
- References (at least 5)
- Figures
- Tables (include multi-column and multi-row cells)
- Comments
- Multiple sections
  - One mathematical section, including:
    - Inline mathematical expression
    - Non-numbered equation in dedicated line
    - Numbered equation in dedicated line
    - Multiline equation
    - Matrices
    - Square root
    - Summation
    - Integration
    - Nested brackets (with varying sizes)
    - Fractions
- Font styles (bold, italics, teletype fonts, etc.)
- Color (text color, text background, page color)
- Lists (itemize, enumerate, description)
- Cross referencing of sections, tables, figures and equations
- Pseudo code of quick sort algorithm

What to submit?

- Please zip all your files, and submit a single file named "`<roll-no>_Ass1.zip`", where `<roll-no>` should be replaced with your IIT Dharwad roll number.

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<sup>1</sup> Please ignore the LaTeX assignment mentioned in lecture 2.

## Beamer

Create a beamer presentation, including the following aspects.

- Title page
- Overlays
  - Stepwise viewing
    - use both `pause` and `onslide` commands
    - both for lists and otherwise (blocks, columns, figures, tables or just sentences)
  - Replace (use at least two commands among `only`, `uncover`, `visible`, `invisible`, `alt` temporal)
  - Highlighting (use both `alert`, `color`)
- Hyperlinks (to a URL, as well as to another slide)
- Structures (columns, blocks)
- Figures
- Tables
- Transitions
- Maths
  - Theorem/Proof environments
  - Multiline equation (stepwise viewing)
- Lists (`itemize`, `enumerate`, `description`)

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## HTML

Create a webpage demonstrating creative use of each of the following HTML elements.

- Elements, Tags and Attributes
- Formatting Tags
- Styles and CSS
- Lists
- Tables
- Phrase Tags
- Doctype and Head Section
- Embedding Images
- Embedding Audio and Video
- Block Elements and Layouts
- Forms

What to submit?

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## Javascript

1. Develop a web-page for Drivers License Eligibility Check, with the following HTML form elements:

- Age (text box)
- Submit (button)

On clicking submit button, perform the following tasks:

- a) If the age does not lie between the interval 18 to 100, display a suitable error message
- b) If constraint is satisfied, display a suitable success message such as: **You are eligible!**

2. Develop a web-page using javascript to do the following:

- a. `palindrome.html`

- Accept a string through a form and declares if it's a palindrome.

- b. `gcd.html`

- Compute gcd of two numbers input through a form, and display it.

- c. `fibonacci.html`

- Accept an integer  $n$ , then generate first  $n$  Fibonacci numbers.

3. Create a webpage that takes a string as input, on button click, computes the most frequently occurring character and displays the output in the following format:

- Input
  - `a,b,a,c,a,g,a,d,a,r,a,f,a,u`
- Output
  - Most Frequent character: `a`
  - Number of occurrences: `7`

4. Develop a web-page to perform the following:

- (a) Accept the details of the User: Name, Address, Phone Number, Email ID, Educational Qualifications, Age, using suitable input elements.
- (b) On clicking submit button, call function `display()`.
- (c) Design the function `display()` such that, it will show the submitted information in a table, in the following format:

User.Name	Kumar
User.Address	FirstStreet
User.Phone Number	9876543210
User.EmailID	kumar@gmail.com
User.Educational Qualifications	B.Tech
User.Age	19

Create class `User` with properties and function `display()`.

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## PHP

Create a photo album with following features.

- Login Form: `index.php` has the form, `login.php` has authentication  
Authenticate using standard credentials:
  - user: eval
  - pass: eva
- `album.php`: Browsing through the album using next, prev, last, first buttons  
Image upload page that allows you to add an image to the album:
- `newupload.php` has the form and `upload.php` does the processing:
  - Check for image format as `jpg` in `php`
  - Check for image size to be less than 200 KB in `php`
  - Maximum of 10 images to upload- check in `php`
  - Images to be uploaded to `images/` directory
  - Errors can be displayed on `upload.php` itself with a back button to enable navigation to the previous page
  - Deleting imagesWe expect `index.php`, `login.php`, `upload.php`, `newupload.php` in the directory.
- Optional (not for credit): Use sessions to validate login sessions while accessing `album.php`, `newupload.php` and `upload.php`. Session has to be initialized at login.

What to submit?

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## SQL

Create a database called `publications`, with two tables – `authors` and `titles`.

Table `authors` will have following schema.

Field	Type	Null	Key	Default	Extra
author	varchar(120)	YES		NOT NULL	
publisher	varchar(30)	YES		NULL	

Table `titles` will have following schema.

Field	Type	Null	Key	Default	Extra
title	varchar(120)	YES		NOT NULL	
author	varchar(120)	YES		NULL	
year	smallint(6)	YES		NULL	

Write a PHP program in which you communicate with this database and have following functionalities:

1. Display all the records in both the tables.
2. Adding a record (available for both the tables).
3. Deleting a record (available for both the tables).
4. Updating year of publication for a given title.
  - It might be possible that user might submit a substring of title.
5. Given a book find its author and year of publication.
  - It might be possible that user might submit a substring in the book.
6. Given a publisher – find all the books (names of the books) which authors from that publisher have published, publication year.
  - i.e., publisher wise listing of books, authors along with publication year
7. When you are updating/adding please do the data type check (i.e. for (2)-(4)).

## Python

1. Create a function `randGen()` to generate a 10,000-line file `dataset.txt`, each line of which is as per the following format

`<age>, <gender>, <state>, <phone number>, <height>, <weight>`

and the corresponding data is to be generated as described below.

- Age (uniformly distributed integer between 1 and 100)
  - Gender (randomly marked as Male or Female)
  - State (randomly chosen from the 28 states of India)
  - Phone number (random 10-digit numbers starting with 6, 7, 8 or 9)
  - Height (Gaussian distributed real number with mean 160 cm and deviation 10 cm)
  - Weight (Gaussian distributed real number with mean 70 kg and deviation 5 kg)
2. Create a `Person` class, with the following attributes: Age, Gender, State, Phone number, Height, Weight.
  3. Generate 10000 instances of the `Person` class with data read from `dataset.txt`.
  4. Calculate the average height and weight of the dataset and append to `dataset.txt`.
  5. Based on the dataset, create the following charts and save them as follows.
    - `height.jpg` including two subplots, namely, histogram of male and female heights
    - `weight.jpg` including two subplots, namely, histogram of male and female weights
    - `gender.jpg` – pie chart of male and female gender
    - `phone.jpg` – pie chart of numbers starting with 6, 7, 8 and 9
    - `age.jpg` – two line plots (with legend) of cumulative distribution function of male age and female age
    - `state.jpg` – bar plot with state name on x-axis and number of people in that state (based on the dataset) as the bar height

What to submit?

- `<roll-no>.py`, where `<roll-no>` should be replaced with your IIT Dharwad roll number.
- It should include all function definitions, class definitions, and the main program.



## Linux

1. Sort the file `/etc/passwd` in ascending order based on the 3<sup>rd</sup> column entries (read them as numbers) *1 mark*
2. Cut the usernames from the file `/etc/passwd` *1 mark*
3. For the text file [data.txt](#) *3 marks*
  - a. List those names that are 5 letters long and starts with Y
  - b. Print records from 6th to 12th line
  - c. Replace name Ankit with Ashish
4. Declare an Array of length 7 and find *6 marks*
  - a. The total number of elements
  - b. Print all the elements
  - c. Print the 5th element
  - d. Extract three elements starting from index two.
  - e. Replace third element with 'Debian' and display.
  - f. Append any new element at the end of Array.
5. Find the sum of first n prime numbers *5 marks*
6. Write a menu driven program for mathematical calculation *2 marks*
  - a. It should take user inputs a and b
  - b. It should ask for mathematical operator (+, -, / and \*).
  - c. Do the calculation
  - d. Print the output
7. Write a program *3 marks*
  - a. Where a function adds all the elements in an array.
  - b. The function should display the sum of elements.
  - c. Make 2 function calls with array elements- (1, 2, 3) and (4, 5, 6).

## What to submit?

- Please zip all your files, and submit a single file named "<roll-no>.zip", where <roll-no> should be replaced with your IIT Dharwad roll number.
- The zip file should contain the following scripts as
  - `script1.sh`
  - `script2.sh`
  - ...
  - `script7.sh`