CPSC 340 Assignment Information

- NEW: If you haven't done so already, get the UBC CS undergraduate account (ugrad ID) here: `https://www.cs.ubc.ca/getacct/`. Anyone registered in the course or the waiting list can get an undergrad ID.

- **Make sure to put your name(s) and student number(s) on the first page**. The TAs have the option of deducting 50% for assignments that are missing names/numbers.

- For assignment 1 you must work on your own. For assignments 2-6 you can work on your own or in a group of 2. You can have different groups on different assignments. If you work in a group, please only hand in *one* assignment and use Gradescope's group feature. (`https://www.gradescope.com/help#help-center-item-student-group-members`)

- The code and data referred to in the assignment will be available in ax.zip (for assignment number 'x') on the course webpage.

- **Submit your assignments as a single PDF to Gradescope.** See Figures 3-6 for reference.

- Your assignment report should be organized sequentially using the subsection numbers in the homework assignment. Figures AND relevant code should be placed in the appropriate location in the document.

- Be sure that your answers are clearly written and easy for the TA to understand. The TAs have the option to reduce your mark if your answers aren't clear or are difficult to understand (even if they are correct). One easy way to reduce the chance of this happening is to prepare your report in LaTeX. To help you with this, I will put the LaTeX file used to generate the assignment PDF on the webpage as a1sol.tex (for assignment 1). You can start with this document and use the $\backslash ans\{\}$ command to put your answers into the document (appearing in green). Here is an example of a legible answer format:

1.2 Matrix Algebra Rules

Assume that $\{x, y, z\}$ are $n \times 1$ column vectors and $\{A, B, C\}$ are $n \times n$ real-valued matrices, 0 is the zero matrix of appropriate size, and I is the identity matrix of appropriate size. State whether each of the below is true in general (you do not need to show your work).

1. $x^T y = \sum_{i=1}^{n} x_i y_i$.

   Answer: 234567

2. $x^T x = \|x\|^2$.

   Answer: 234567

3. $x^T x = x x^T$.

Figure 1: Short answer example

- When uploading a PDF you will be prompted to indicate which page contains which question. Make sure to indicate **all** pages that correspond to your question, as showed in the images below:

- **make sure all questions are assigned to at least one page** if you fail to do so, that may result in having a score of 0 for that question.

- For questions that ask for code, **you should include the code in the PDF document at the appropriate location**. If only a small change to an existing code was required, then it's sufficient to include the changed part in the PDF and to say where in the code the change was made. Although
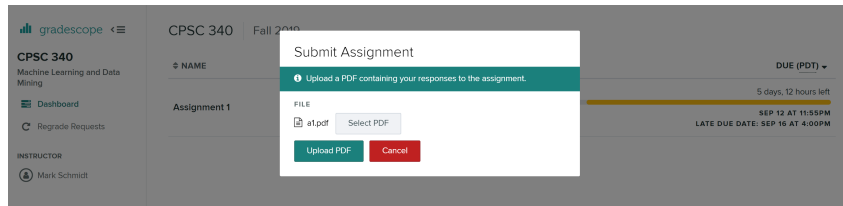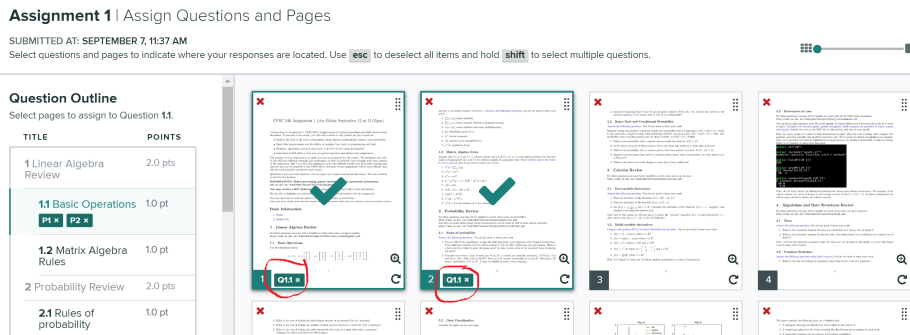
Figure 2: When uploading the file

Figure 3: Assigning questions to pages

there are various packages that allow you to include code in LATEXfiles, the easiest way to include code is to just include a screenshot using the "includegraphics" command.

- If you use information from students outside your group or from online sources, cite this at the start of each question. **You will receive a mark of 0 for the assignment (and possibly more) if you are found copying from other sources without citation**.

- Make sure to do the version of the assignment from the current semester.

- Assignments are due **5 minutes** before midnight 'Pacific Standard Time' PST on the submission deadline.

- Note that you can submit your assignment to Gradescope more than once, so you should submit a prelimanary version in advance of the actual deadline.

- You have a total of 4 possible "late classes", where a late class means you submit the assignment after the deadline but before midnight PST on the day of the next class. You can use at most 2 late classes on any one assignment. Start your homework early to reduce the chance that something comes up. We will not respond to excuses like "I forgot the deadline" or "I fell asleep"; if you miss the deadline you will use a late class, and if you go past 2 late classes for one assignment (or 4 total) you will receive 0 for further lateness.

- All homeworks are equally weighted, and all sections within each homework are equally weighted (though subsections may be weighted differently).

- We'll try to provide grades within 10 days of the initial assignment submission deadline.

- If you perceive a problem with your homework grade, you have one week to raise a concern from the time that your grades were posted. After that, your grade is final.

- Any modifications/updates/clarifications after the assignment is first put online will be marked in red. Be sure to check for minor updates, while if there are major updates I will announce these in class or

Figure 4: If you are working in pairs, *submit your assignment first* and then configure your group using the "Group Members" button.
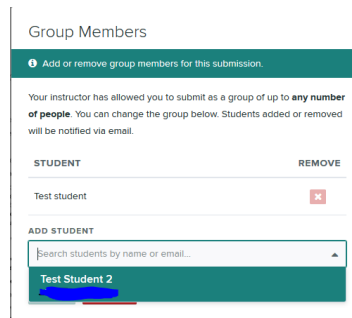

Figure 5: Select your partner using the dialog box. Make sure your partner has a valid email address and csid.

I will spam you via Piazza.

3.3 Derivatives of code

For these questions you may find it helpful to review this list of useful Julia commands:
http://www.cs.ubc.ca/~schmidtm/Courses/Notes/juliaCommands.txt

The zip file `a1.zip` contains a Julia file named `grads.jl` which defines several functions that take in a vector as input. Complete the functions `grad1`, `grad2`, and `grad3` (which compute the gradients of `func1`, `func2`, and `func3`). Include the code in the PDF file for this section, and also in your zip file.

Hint: for many people it's easiest to first understand on paper what the code is doing, then compute the gradient, and then translate this gradient back into code. We've given you `func0` and `grad0` as an example. Also, we've provided the function `numGrad` which approximates the gradient numerically to help you debug. Below is an example of using these functions:

Note: do not worry about the distinction between row vectors and column vectors here. For example, if the correct answer is a vector of length 5, we'll accept vectors of size 5×1 or 1×5. In future assignments we will be more careful to always use column vectors.

```python
import os
import sys
import random
import math
import numpy as np
import skimage.io
import matplotlib
import matplotlib.pyplot as plt

# Root directory of the project
ROOT_DIR = os.path.abspath("../")

# Import Mask RCNN
sys.path.append(ROOT_DIR)  # To find local version of the library
from mrcnn import utils
import mrcnn.model as modellib
from mrcnn import visualize
# Import COCO config
sys.path.append(os.path.join(ROOT_DIR, "samples/coco/"))  # To find local version
import coco

%matplotlib inline

# Directory to save logs and trained model
MODEL_DIR = os.path.join(ROOT_DIR, "logs")

# Local path to trained weights file
COCO_MODEL_PATH = os.path.join(ROOT_DIR, "mask_rcnn_coco.h5")
# Download COCO trained weights from Releases if needed
if not os.path.exists(COCO_MODEL_PATH):
    utils.download_trained_weights(COCO_MODEL_PATH)

# Directory of images to run detection on
IMAGE_DIR = os.path.join(ROOT_DIR, "images")
```

Figure 1: derivative of code

Figure 6: What a question with code will look like