DS 1000B – Assignment 1

Total Marks: 50

Due date: Monday January 19th, 8:00 PM

Submission Platform: All assignments must be submitted via Gradescope.

File Format: Submit a **single** PDF file containing all of your work. Please note that Gradescope only displays your most recent submission and this is the version that will be graded.

You will receive a grade of zero in each case where

- Submission is not in PDF format.
- **Questions have no pages assigned to them on Gradescope** (i.e. did not submit anything for that question).
- Submission is illegible (e.g. blurry, too small to read comfortably without zooming in).

You must submit the following as a single PDF file:

- Part 1 – Written responses (these may be handwritten or typed).

  Multiple choice questions do not require work to be shown.

  Unless otherwise specified, please show your work.

- Part 2 – Python coding exercises with some written responses.

  Acceptable submission formats:

  - Screenshot showing both the code cell and the corresponding output (from Google Colab, a local Jupyter notebook, or another Python environment).
  - Copy-pasted code with the output clearly labeled below it in a screenshot or text (where applicable).

Individual Work: Each student must submit their own original work. You may discuss questions with your classmates, but you must write up your solutions independently.

Provided your submission adheres to the requirements outlined above, the method you use to generate the document is at your discretion.

Part 1 – Written Responses

Section A: Course Components [22 marks]

Q1. Assignments. Please select one answer for each of the following questions about the assignments.

(a) (1 mark) Where do we submit our assignments?

A. OWL **B.** Email **C.** **Gradescope** **D.** Piazza **E.** GitHub

(b) (1 mark) What file format must you use for your assignment submission?

A. Word document (.docx)

B. **PDF (.pdf)**

C. PowerPoint (.pptx)

D. JPEG image (.jpg)

E. Plain text (.txt)

(c) (1 mark) Are your submissions allowed to include screenshots / photos of handwritten work?

A. **Yes** **B.** No

(d) (1 mark) If you submit your assignment multiple times before the deadline, which submission will be graded?

A. The first submission

B. **The most recent submission**

C. It is vibe-based

D. All submissions are averaged

E. A randomly selected submission

(e) (1 mark) What is the maximum time after an assignment deadline that you can submit an assignment without penalty?

A. 12 hours **B.** **48 hours** **C.** 24 hours **D.** 72 hours **E.** 1 week

(f) (1 mark) If you are late even by one second after the grace period, will your assignment be accepted?

A. Yes, with a 25% penalty

B. Yes, with a 50% penalty

C. Yes but only if your internet was slow when you were uploading the assignment

D. **No, submissions will not be accepted after the grace period**

(g) (1 mark) How do you request regrades for an assignment?

A. Emailing the instructor directly

B. Sending a strongly worded letter to the associate dean

C. **By first reviewing the assignment solutions to check for errors in grading and then using Gradescope's regrade request feature**

D. Through the office hours

E. Submit a new assignment

(h) (1 mark) A student misses an assignment due to illness. According to the syllabus, do they need to submit an Academic Consideration request for this missed assignment?

A. Yes, they must submit a request within 48 hours with documentation

B. **No, the lowest assignment grade is automatically dropped**

C. No, but they must notify the instructor by email

(i) (1 mark) A missed assignment will result in a grade of 0.

A. **True** **B.** False

(j) (1 mark) Questions which are not properly matched on Gradescope (i.e. no pages assigned) will receive a grade of 0.

A. **True** **B.** False

(k) (1 mark) Questions which are illegible (e.g. blurry, too small to read comfortably without zooming in) will receive a grade of 0.

A. **True** **B.** False

(l) (1 mark) Are students permitted to discuss assignment problems with classmates?

A. **Yes** **B.** No

(m) (1 mark) What requirement applies when writing solutions?

A. Students may form a collective hivemind and submit one answer for the entire class

B. **Each student must write up their solutions independently but they may discuss high level concepts with classmates**

C. Students must hire a scribe to transcribe their thoughts while they dictate dramatically

D. Students must work in assigned groups of 3–4, with one person doing all the work while others provide moral support

(n) (1 mark) I am allowed to use AI tools to help me with my assignments only if

A. Sam Altman personally provided me with a special exemption

B. **The assignment explicitly states that AI tools are permitted**

C. I promise to cite ChatGPT in MLA format and thank it in my acknowledgments section

D. The AI personally assures me that "this definitely won't get caught by plagiarism detection"

E. I use incognito mode while accessing the AI

(o) (1 mark) For Python questions, I only need to include my code in my submission. I do not need to include any output from running the code.

A. **False. You must include both your code and its output unless otherwise specified.**

B. True.

(p) (1 mark) In the written response component of assignments, do I need to show my work?

A. **Yes, unless otherwise specified or the question is multiple choice.**

B. No, only the final answer matters.

Q2. Labs. Please select one answer for each of the following questions about labs.

(a) (1 mark) Is lab attendance mandatory?

A. Yes, attendance is taken.

B. Yes, the labs will have pop quizzes worth 40% of the final grade.

C. **No, but they are highly recommended for practicing course concepts and learning Python.**

D. Yes, assignments can only be submitted through the lab sessions.

(b) (1 mark) What will be covered in the labs?

A. Advanced theoretical concepts not discussed in lectures.

B. **Practical applications of lecture concepts using Python programming and additional practice with course material.**

C. Guest lectures from industry professionals.

Q3. Midterm. Please select one answer for each of the following questions about the midterm.

(a) (1 mark) What is the tentative date for the midterm?

A. **Sunday, March 1, 2026**

B. Whenever Mercury is in retrograde and the stars align

C. On a Tuesday, unless it's raining, then it's Wednesday

D. The exact moment I realized I should have started studying earlier

(b) (1 mark) When and where can I expect to find information regarding the midterm (e.g. format, coverage and logistics)?

A. During the lecture immediately before the exam, whispered cryptically by the instructor

B. **On OWL, by February 14th, 2026**

C. In a dream, but only if one has been studying hard enough

D. Via carrier pigeon, weather permitting

E. Hidden in a series of elaborate riddles posted around campus

(c) (1 mark) Is there a make-up midterm offered in this course?

A. Yes **B.** **No**

(d) (1 mark) If a student misses the midterm with approved academic consideration, what is the weight of their final exam?

A. 50% **B.** 65% **C.** 70% **D.** **85%** **E.** 100%

Section B: General Administrative Questions [4 marks]

Q4. Please select one answer for each of the following questions about course communications.

(a) (1 mark) What is the preferred platform for asking questions about course content and assessments outside of class?

A. Email **B.** OWL Forums **C.** **Piazza** **D.** Discord **E.** Carrier Pigeon

(b) (1 mark) Prior to posting a question on Piazza, what should you do first?

A. Ask a TA in person

B. **Search the existing posts or relevant documents to see if your question has already been answered**

C. Email the instructor

D. Post the question immediately without checking

(c) (1 mark) Which of the following should be asked as a **private post** rather than a public post on Piazza?

A. Questions about lecture content

B. Clarifications about assignment instructions

C. **Topics of a sensitive or personal nature**

D. Questions about Python syntax

E. Discussion of course topics

(d) (1 mark) Which of the following is **outside** the scope of support provided by your TAs or instructors?

A. **General technical support, e.g. issues pertaining to installing software or PDF conversion**

B. Clarifications about assignment instructions

C. Confusion regarding course content

Section C: Grade Calculation [14 marks]

The course grade policy in this course has some nuance. The following questions will help clarify how your final grade is determined.

Assignment Average: Best 4 of 5 assignments (lowest dropped)
Assessment Grade:

$$\text{Assessment Grade} = \max(0.35M + 0.50E,\ 0.85E) \times \frac{100}{85}$$

where M = Midterm, E = Final Exam
Course Grade:

- If Assessment Grade $\geq 50\%$: Course Grade $= 0.15(\text{Assignments}) + 0.85(\text{Assessment Grade})$
- If Assessment Grade $< 50\%$: Course Grade $=$ Assessment Grade

Q5. Suppose Alice has the following grades.

- Assignments: 100%, 75%, 90%, 0%, 0%
- Midterm: 55%
- Final Exam: 70%

(a) (1 mark) What is Alice's assignment average (for her best 4 of 5 assignments)?

A. **66.25%** **B.** 73.75% **C.** 81.67% **D.** 88.33% **E.** 91.67%

Solution: The best 4 out of the 5 assignment scores are 100%, 75%, 90%, 0%.

The average of these is

$$= \frac{100 + 75 + 90 + 0}{4} = \frac{265}{4} = \boxed{66.25\%}$$

(b) (1 mark) Which of the following is Alice's assessment grade?

A. 54.25% **B.** 59.50% **C.** **70.00%** **D.** 74.12% **E.** 85.00%

Solution: The assessment grade is the maximum of the following two schemes multiplied by $\frac{100}{85}$:

Option 1: $0.35(55) + 0.50(70) = 19.25 + 35 = 54.25$

Option 2: $0.85(70) = 59.5$ Thus, $\max(54.25, 59.5) = 59.5$ and the assessment grade is

$$= 59.5 \times \frac{100}{85} = \boxed{70.00\%}$$

(c) (1 mark) Which of the following is Alice's course grade?

A. 54.25% **B.** 59.50% **C.** **69.44%** **D.** 70.00% **E.** 81.67%

Solution: Since assessment grade is at least 50%, the course grade is

$$= 0.15(\text{Assignment Average}) + 0.85(\text{Assessment Grade})$$
$$= 0.15(66.25) + 0.85(70) = 9.9375 + 59.5 = \boxed{69.44\%}$$

Q6. Suppose Bob has the following grades.

- Assignments: 100%, 90%, 90%, 100%, 80%
- Midterm: 40%
- Final Exam: 35%

(a) (1 mark) What is Bob's assignment average (for his best 4 of 5 assignments)?

A. 93.75% **B.** **95.00%** **C.** 96.25% **D.** 97.50% **E.** 98.00%

Solution: The best 4 out of the 5 assignment scores are 100%, 100%, 90%, 90%.

The average of these is

$$= \frac{100 + 100 + 90 + 90}{4} = \frac{380}{4} = \boxed{95.00\%}$$

(b) (1 mark) Calculate Bob's assessment grade.

Solution: Option 1: $0.35(40) + 0.50(35) = 14 + 17.5 = 31.5$

Option 2: $0.85(35) = 29.75$

$\max(31.5, 29.75) = 31.5$

Assessment Grade $= 31.5 \times \frac{100}{85} = \boxed{37.06\%}$

(c) (1 mark) What is Bob's course grade?

Solution: Since Assessment Grade $= 37.06\% < 50\%$:

Course Grade = Assessment Grade $= 37.06\%$

Q7. Suppose Caleb has the following grades:

- Assignments: 100%, 90%, 90%, 100%, 80%
- Midterm: 40%

(a) (1 mark) Which of the following is the minimum final exam grade Caleb needs to pass the course?

A. 30.00% **B.** 34.75% **C.** 42.00% **D.** **50.00%** **E.** 61.50%

Solution: To pass, we need Course Grade $\geq 50\%$. This requires Assessment Grade $\geq 50\%$.

Assessment Grade $= \max(0.35M + 0.50E,\ 0.85E) \times \frac{100}{85}$, with $M = 40$.

Option 1: $0.35(40) + 0.50E = 14 + 0.5E$

Option 2: $0.85E$

Set E so that Assessment Grade ≥ 50:

For $E \leq 40$, Option 1 is larger:

$$\text{Assessment Grade} = (14 + 0.5E) \times \frac{100}{85}$$

Set ≥ 50:

$$14 + 0.5E \geq 42.5 \implies 0.5E \geq 28.5 \implies E \geq 57$$

But for $E > 40$, Option 2 is larger:

$$\text{Assessment Grade} = 0.85E \times \frac{100}{85} = E$$

So we need $E \geq 50$.

Minimum final exam grade needed to pass: $\boxed{50\%}$

(b) (1 mark) Suppose Caleb scores 49% on the final exam. What is his final course grade?

Solution: Option 1: $0.35(40) + 0.50(49) = 14 + 24.5 = 38.5$

Option 2: $0.85(49) = 41.65$

$\max(38.5, 41.65) = 41.65$

Assessment Grade $= 41.65 \times \frac{100}{85} = 49\%$

Since Assessment Grade $= 49\% < 50\%$:

Course Grade $= 49\%$

(c) (1 mark) Suppose Caleb scores 50% on the final exam. What is his course grade?

Solution: Option 1: $0.35(40) + 0.50(50) = 14 + 25 = 39$

Option 2: $0.85(50) = 42.5$

$\max(39, 42.5) = 42.5$

Assessment Grade $= 42.5 \times \frac{100}{85} = 50\%$

Since Assessment Grade $= 50\% \geq 50\%$:

Assignment Average $= 95\%$ (best 4 of 5)

Course Grade $= 0.15(95) + 0.85(50) = 14.25 + 42.5 = 56.75\%$

Q8. Suppose Danielle has the following grades:

- Assignments: 100%, 90%, 90%, 100%, 80%
- Midterm: 90%

(a) (3 marks) What is the minimum final exam grade Danielle needs to pass?

Solution: To pass, we need Course Grade $\geq 50\%$. This requires Assessment Grade $\geq 50\%$.

For $E < 90$: The raw weighted average is $0.35(90) + 0.50E = 31.5 + 0.5E$.

Assessment Grade $= (31.5 + 0.5E) \times \frac{100}{85}$

We need $(31.5 + 0.5E) \times \frac{100}{85} \geq 50$.

Solving: $31.5 + 0.5E \geq 50 \times \frac{85}{100} = 42.5 \implies 0.5E \geq 11 \implies E \geq 22\%$.

The minimum final exam grade is 22%.

(b) (2 marks) What is the minimum final exam grade Danielle needs to get a course grade of 80%?

Solution: Danielle's assignment average is 95%. To obtain a course grade of 80%, we need either that

$$0.15(95) + 0.85E = 80,$$

where $E \geq 90$. But, if $E \geq 90$, then

$$\begin{aligned} 14.25 + 0.85E \geq 14.25 + 0.85(90) &= 14.25 + 76.5 \\ &= 90.75 \\ &> 80. \end{aligned}$$

Thus, a lowerbound is achieved when $E < 90$, so we need to solve

$$14.25 + 0.35(90) + 0.50E = 80$$

Rearranging gives

$$\begin{aligned} 14.25 + 0.35(90) + 0.50E &= 80 \\ \implies 0.50E &= 80 - 14.25 - 31.5 \\ \implies 0.50E &= 34.25 \\ \implies E &= \frac{34.25}{0.50} = 68.5\% \end{aligned}$$

So, the minimum final exam grade Danielle needs to get a course grade of 80% is $\boxed{68.5\%}$.

Part 2 – Python

Getting started with Python [10 marks]

Instructions: For each question, write the required Python code, run it, and include both your code and its output in your submission. You may use a screenshot or copy and paste the results.

Q9. (1 mark) Write Python code that prints the message:

`Welcome to DS 1000`

Solution:

Python Code

```
print("Welcome to DS 1000")
```

Output: `Welcome to DS 1000`

Q10. In this question, you will build a Python program that calculates a student's course grade using the grading policy from Section C. We will build this step-by-step.

Grading Formulas Reference
Assignment Average: Best 4 of 5 assignments (lowest dropped)
Assessment Grade:

$$\text{Assessment Grade} = \max(0.35M + 0.50E,\ 0.85E) \times \frac{100}{85}$$

where M = Midterm, E = Final Exam
Course Grade:

- If Assessment Grade $\geq 50\%$: Course Grade $= 0.15(\text{Assignments}) + 0.85(\text{Assessment Grade})$
- If Assessment Grade $< 50\%$: Course Grade $=$ Assessment Grade

Suppose a student has the following grades:

```
Assignment average: 90
Midterm: 55
Final Exam: 70
```

(a) (2 marks) Create variables to store the input data. Define:

- A variable called `assignments_avg` containing the average of the best 4 of 5 assignments. For this question, set it to `90`.
- A variable called `midterm` with the midterm grade
- A variable called `final_exam` with the final exam grade

Print all three variables to verify they are correct.

Solution:

Python Code

```
assignment_avg = 90
midterm = 55
final_exam = 70

print(assignment_avg)
print(midterm)
print(final_exam)
```

Output:

```
90
55
70
```

(b) (3 marks) Calculate the assessment grade.

Using `midterm = 55` and `final_exam = 70`, compute:

$$\text{Assessment Grade} = \max(0.35M + 0.50E,\ 0.85E) \times \frac{100}{85}$$

Hint: Use the `max()` function to find the larger of two values.

Print the assessment grade.

Solution:

Python Code

```
midterm = 55
final_exam = 70

option1 = 0.35 * midterm + 0.50 * final_exam
option2 = 0.85 * final_exam

assessment_grade = max(option1, option2) * (100 / 85)
print(assessment_grade)
```

Output: `70.0`

(c) (2 marks) Calculate the course grade using your values from parts (a) and (b). Print the course grade.

Solution:

Python Code

```
assignment_avg = 90
assessment_grade = 70.0

if assessment_grade >= 50:
    course_grade = 0.15 * assignment_avg + 0.85 * assessment_grade
else:
    course_grade = assessment_grade

print(course_grade)
```

Output: `73.0`

(d) (2 marks) Redo the calculation in part (c) for a student with the following grades:

- Assignment average: 100
- Midterm: 60
- Final Exam: 40

Print the course grade.

Solution:

Python Code

```
assignment_avg = 100
midterm = 60
final_exam = 40

option1 = 0.35 * midterm + 0.50 * final_exam
option2 = 0.85 * final_exam
assessment_grade = max(option1, option2) * (100 / 85)

if assessment_grade >= 50:
  course_grade = 0.15 * assignment_avg + 0.85 * assessment_grade
else:
  course_grade = assessment_grade

print(course_grade)
```

Output: `48.24`