

Assignment 2, Part 2: Sequences and Summations

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Due Tuesday by 11:59pm **Points** 100 **Submitting** a text entry box or a file upload
File Types pdf **Available** until Jan 25 at 11:59pm

Purpose



Sequences and summations arise regularly in the analysis of algorithms, financial applications, physical problems, and probabilistic systems. The purpose of this assignment is to study the notations of sequences and summations and general techniques to solve summations ([CLO 5 \(https://canvas.oregonstate.edu/courses/1946372/pages/start-here-overview\)](https://canvas.oregonstate.edu/courses/1946372/pages/start-here-overview)), [MLOs 5-6 \(https://canvas.oregonstate.edu/courses/1946372/pages/week-2-overview\)](https://canvas.oregonstate.edu/courses/1946372/pages/week-2-overview)).

Instructions

This assignment is due by Tuesday (Week 3) at Midnight. A late assignment must be submitted no more than 48 hours after the original deadline (with a 15% penalty every 24 hours).

Write complete answers to each of the following questions. All are from the ends of the indicated sections in our text; for these, you must provide complete answers in accordance with the directions given (**in the rubric**). You **MUST** show your work here. This is not a group project; do your own work. You must follow the header format as below -

First name Last name

CS-225: Discrete Structures in CS

Homework 2, Part 2

Canvas Problem # (.....)

Lastly, you do not have to rewrite the questions.

Homework Problems

1. Find explicit formulas for sequences of the form a_1, a_2, a_3, \dots with the initial terms given below:

- $\frac{1}{4}, \frac{3}{12}, \frac{5}{36}, \frac{7}{108}, \frac{9}{324}, \dots$
- $0, -\frac{1}{3}, \frac{2}{4}, -\frac{3}{5}, \frac{4}{6}, -\frac{5}{7}, \dots$

Solve the following summation problems (You have to apply formulas to solve the following summation problems. Writing the summations in expanded forms won't be considered as correct answers. Some examples of correct answers are provided here - [Help on HW-2, Part 2.pdf](https://canvas.oregonstate.edu/courses/1946372/files/102823768?wrap=1) (<https://canvas.oregonstate.edu/courses/1946372/files/102823768?wrap=1>).(download the .pdf if you see errors on the in-browser preview). Finally, you don't have to provide a final numerical value, an intermediate form will be sufficient. For example, the three answers in the attached example answers are complete because the summation formulas have been applied, but they are left in intermediate form because they have not been evaluated into a single numerical value.) -

$$2. \sum_{k=1}^n \frac{2k+1}{(k^2 (k+1)^2)}$$

*Hint: Use the telescoping sum technique.

$$3. \sum_{i=30}^{500} (10i - \frac{5}{2})$$

$$4. \sum_{j=0}^{200} (20j^2 - (-20)^j)$$

** Hint: Please note that

$$\sum_{i=0}^n i^2 = 0^2 + 1^2 + 2^2 + \dots + (n-1)^2 + n^2 = 0 + \sum_{i=1}^n i^2 = \sum_{i=1}^n i^2$$

$$5. 4 \sum_{k=1}^{15} (14k^2 + 9) + 6 \sum_{k=1}^{15} (15k^2 - 7)$$

P.S: You must make use of the formulas provided in [Summation Properties Formulae.pdf](https://canvas.oregonstate.edu/courses/1946372/files/102823801?wrap=1) (<https://canvas.oregonstate.edu/courses/1946372/files/102823801?wrap=1>) to solve the problems.

Submission Details

Assignments should be submitted to Canvas in .pdf format. You are allowed to submit scanned handwritten answers saved in .pdf format as well.

Academic Integrity Reminder

Note: completion of this assignment using work from external sources (e.g. other students or websites) is likely to cause unintended academic misconduct violations. Examples of these may include [plagiarism](https://canvas.oregonstate.edu/courses/1946372/pages/academic-integrity-at-osu) (<https://canvas.oregonstate.edu/courses/1946372/pages/academic-integrity-at-osu>) and/or [cheating](https://canvas.oregonstate.edu/courses/1946372/pages/academic-integrity-at-osu) (<https://canvas.oregonstate.edu/courses/1946372/pages/academic-integrity-at-osu>).

We recognize that, in the process of completing your work, you may wish to consult various sources. Please refer to the resources in the [Academic Integrity Module](https://canvas.oregonstate.edu/courses/1946372/modules/3118541) (<https://canvas.oregonstate.edu/courses/1946372/modules/3118541>), or contact your instructor if you are not sure if your work is compliant with the [Code of Student Conduct](https://) (<https://>

studentlife.oregonstate.edu/pre-student-conduct-community-standards).

Grading Criteria

Below is the rubric that would be used to grade this assignment. This assignment will be graded within **5** days of its *due date*.

HW-2, Part 2

Criteria	Ratings		Pts
<p>Question #1 on Canvas</p> <p>Deriving the explicit formulas for the given sequences. For each sequence, you must mention the domain of the index variable to receive full credit.</p>	<p>20 to >15.0 pts Full Marks</p> <p>Derived both of the explicit formulas correctly.</p>	<p>15 to >0 pts Partial Credit</p> <p>One or more formulas are incorrect or the work is incomplete.</p>	20 pts
<p>Question #2 on Canvas</p> <p>Computing the summation.</p> <p>You must show your work.</p>	<p>20 to >15.0 pts Full Marks</p> <p>Simplified the expression correctly.</p>	<p>15 to >0 pts Partial Credit</p> <p>The step/s is/are incorrect. Or have not applied the summation rules as instructed.</p>	20 pts
<p>Question #3 on Canvas</p> <p>Computing the summation by applying formulas.</p> <p>You must show your work. Also, you don't have to provide a final numerical value, an intermediate form will be sufficient.</p>	<p>20 to >15.0 pts Full Marks</p> <p>Simplified the expression correctly.</p>	<p>15 to >0 pts Partial Credit</p> <p>The step/s is/are incorrect. Or have not applied the summation rules as instructed.</p>	20 pts
<p>Question #4 on Canvas</p> <p>Computing the summation by applying formulas.</p> <p>You must show your work. Also, you don't have to provide a final numerical value, an intermediate form will be sufficient.</p>	<p>20 pts Full Marks</p> <p>Simplified the expression correctly.</p>	<p>20 to >0 pts Partial Credit</p> <p>The step/s is/are incorrect. Or have not applied the summation rules as instructed.</p>	20 pts
<p>Question #5 on Canvas</p> <p>Computing the summation by applying formulas.</p> <p>You must show your work. Also, you don't have to provide a final numerical value, an intermediate form will be sufficient.</p>	<p>20 to >15.0 pts Full Marks</p> <p>Simplified the expression correctly.</p>	<p>15 to >0 pts Partial Credit</p> <p>The step/s is/are incorrect. Or have not applied the summation rules as instructed.</p>	20 pts
<p>Late Deduction</p> <p>15% deduction for each day (up to two days).</p>	<p>0 pts Deduction Rule</p> <p>The submission is -- Late by 10 minutes – 24 hours (-15 points) - Late by >24 hours – 48 hours (-30 points) - Late by >48 hours (-100 points)</p>	<p>0 pts Full Marks</p>	0 pts

Criteria	Ratings	Pts
Total Points: 100		