

MATH 3430 Assignment 4 ¹

Directions: This assignment consists of coding problems only. Save your code in a single file named

`hw4-lastname.py`

(hyphen and NO SPACES in the filename!) and submit it through BlackBoard.

As always, you may NOT use any Python ideas, keywords, or concepts that have not been discussed in class; in particular, you may not use any imported modules, lists, or **for** loops.

(1) (5 points) Use an **input** statement with a prompt, asking the user to enter a positive integer N . This integer N will be used for each of the remaining problems.

(2) (5 points) First write a print statement to print the string
***** Problem 2 *****.
Then use a **while** loop to print $1/n^2$, for all integers n in the interval $[1, N]$.

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(3) (5 points) First write a print statement to print the string
***** Problem 3 *****.

Then use a **while** loop to calculate

$$\sum_{j=1}^N \frac{1}{j^2},$$

and print the result. Do this as follows:

- (1 pt) Do an example by hand, with $N = 4$: successively compute each of

$$\sum_{j=1}^1 \frac{1}{j^2}, \quad \sum_{j=1}^2 \frac{1}{j^2}, \quad \sum_{j=1}^3 \frac{1}{j^2}, \quad \sum_{j=1}^4 \frac{1}{j^2}.$$

Include the details of this in your comments.

- (1 pt) If you already know $\sum_{j=1}^{n-1} \frac{1}{j^2}$, how can you find $\sum_{j=1}^n \frac{1}{j^2}$ with minimal effort? Explain this in your comments.
- (1 pt) Explain how to, by hand, solve a general instance of this problem with minimal effort.
- (2 pts) Write the code to solve this problem.

(4) (5 points) First write a print statement to print the string
***** Problem 4 *****.

Use a **while** loop to calculate and print $n!$ (n factorial) for all integers n in the interval $[1, N]$. Do this as follows:

- (1 pt) Do an example by hand, with $N = 4$: successively compute each of $1!, 2!, 3!, 4!, 5!$. Include the details of this in your comments.
- (1 pt) If you already know $(n-1)!$, how can you find $n!$ with minimal effort? Explain this in your comments.
- (1 pt) Explain how to, by hand, solve a general instance of this problem with minimal effort.
- (2 pts) Write the code to solve this problem.

(5) (5 points) First write a print statement to print the string
***** Problem 5 *****.

Use a **while** loop to calculate

$$\sum_{n=0}^N \frac{1}{n!},$$

and print the result.