Name: _____

Date: _____

Collaborators: _____

(If applicable, collaborators submit their individually written assignments together)

Question:	1	2	3	4	Total
Points:	15	10	45	10	80
Score:					

Instructor/grader comments:

Complexity

1. (15 points) Find the **leading** in n term (assume $n \gg 1$) of the following sum:

$$S(n) = \sum_{i=1}^{n} \frac{3^{\sqrt{i}}}{\sqrt{i}}$$

   Show all your calculations in the space below.

Vector and matrix norms

2. (10 points) Find p-norm of the identity $n \times n$ matrix. Show all your calculations in the space below.

   Hint: start from the definition of the matrix norm

Condition numbers

3. Consider the following $n \times n$ matrix':

$$A_n = \begin{bmatrix} 1 & -2 & & & & & & \\ & 1 & -2 & & & & & \\ & & 1 & -2 & & & & \\ & & & \ddots & \ddots & & & \\ & & & & \ddots & \ddots & & \\ & & & & & 1 & -2 & \\ & & & & & & 1 & -2 \\ & & & & & & & 1 \end{bmatrix}$$

(a) (10 points) Use Matlab to find A_2^{-1}, A_3^{-1}, ... Look until you are certain of the pattern. Write A_n^{-1} for arbitrary n in the space below:

(b) (15 points) Use ∞-norm to find $\kappa_\infty(A_n)$. Write your calculations in the space below.

(c) (10 points) Write Matlab function `hw06p3a(n)` that accepts the size n and returns A_n. Use the Matlab function `spdiags` to create sparse banded matrices. Place the code for the function into its own file.

(d) (10 points) Write Matlab script, **hw06p3.m**, that uses your function to generate A_{100} and A_{200} and calculate and print their condition numbers using Matlab function `cond`. Compare Matlab's condition numbers with $\kappa_\infty(A_n)$ your obtained above. Use the Matlab function `full` to convert a sparse matrix to a regular one, if needed. Place the command `clear` at the top of your script.

Gitlab

4. (10 points) Create a Gitlab project called **hw06** (name it exactly as shown). Upload **all** matlab files that are required to run your code. **Do not** upload other types of files. Share the project with the instructor (gitlab user name `m3510_21f_in`) and the TA (gitlab user name `m3510_21f_ta`) and grant them the **Reporter** privileges.