Name: _____

Date: _____

Section: _____

Collaborators: _____

(Collaborators submit their individually written assignments together)

Question:	1	2	3	4	5	6	Total
Points:	15	10	5	20	10	10	70
Score:							

Instructor/grader comments:

Vector and matrix norms

1. Find l_2 and l_∞ norms of the vectors.

   (a) (5 points) $x = (3, -4, 0)$

   (b) (5 points) $x = (1, 2, 3, 4)$

   (c) (5 points) $x = (\sin k, \cos k, 1)$ for arbitrary real k

2. (10 points) Find l_p norm of the identity $n \times n$ matrix.

   Hint: start from the definition of the matrix norm

3. Find l_∞ and l_1 norms of the matrix.

   (a) (5 points)

$$\begin{bmatrix} 2 & 5 & 0 & 0 & 0 & 0 & 0 & 3 \\ 0 & -5 & 3 & 2 & 4 & 0 & 0 & 0 \\ 0 & 0 & 0 & -2 & 0 & 2 & 1 & 0 \\ 1 & -1 & -1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 & 0 & -1 \\ 0 & 0 & 1 & -1 & 0 & -1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & -1 & 0 \\ 0 & 0 & 0 & 1 & -1 & 0 & 1 & 0 \end{bmatrix}$$

Complexity

4. (a) (10 points) How many floating point operations it takes to multiply two matrices of size $n \times n$? Explain your reasonong.

   (b) (10 points) It takes about 10^{-2} seconds (on a slow computer) to multiply a two matrices and of size 10^4. **Estimate** how long it takes to multiply a matrices size 10^6. Explain your reasonong.

5. (10 points) Find the **leading** in n term of the following sum:

$$\sum_{i=1}^{n} \left(4i^3 + 3i^2 + 3\right)$$

Gitlab

6. (10 points) Create a gitlab project called **hw04** (name it exactly as shown). Upload **all** matlab files that are required to run your code. Share the project with the instructor and the TA and grant them **Reporter** privileges.