

Name: _____

Date: _____

Collaborators: _____

(Collaborators submit their individually written assignments together)

Question:	1	2	3	4	Total
Points:	35	25	25	10	95
Score:					

Instructor/grader comments:

Interpolating of functions

1. (pen and paper problem) Let \mathbf{F} be the quasimatrix on $x \in [-1, 1]$:

$$\mathbf{F} = [1 \quad \cos(\pi x) \quad \sin(\pi x)].$$

- (a) (15 points) Find $\mathbf{F}^T x$
- (b) (20 points) Find $\mathbf{F}^T \mathbf{F}$.

2. (a) (15 points) (pen and paper problem) Find the best linear approximation (in the least squares sense) to the function $\sin(x)$ on the interval $[-1, 1]$.

- (b) (10 points) On the same graph plot the function and its approximation. Place the code you wrote for this part of the homework into a matlab file **hw05p2b.m**

3. (a) (15 points) (pen and paper problem) Use the recurrence relation to find $P_2(x)$, $P_3(x)$, and $P_4(x)$.

$$P_k(x) = \frac{2k-1}{k} x P_{k-1}(x) - \frac{k-1}{k} P_{k-2}(x), \quad k = 2, 3, \dots$$

- (b) (10 points) On the same graph plot $P_k(x)$, $k = 1, 2, 3, 4$ for $-1 \leq x \leq 1$. Place the code you wrote for this part of the homework into a matlab file **hw05p3b.m**

Gitlab

4. (10 points) Create a gitlab project called **hw05** (name it exactly as shown). Upload **all** required matlab code and create your create an empty README.md file. **Chose a suitable license**. Share the project with the instructor and the grader.