**In-Lab Group Activity for Week 8: Curve Fitting and Norms**

**Spring 2022 Name: Cole Bardin**

***first     last***

**Problem 1: Norms**: 1-norm, 2-norm and ∞-norm, orthogonality Consider these four vectors from .

**a.** Which of these vectors has the largest **∞-norm**?

**b.** Which of these vectors in has the smallest **1-norm**?

**c.** Do all the vectors have the same **2-norm** as ? **Yes No**

**d.** Which of these vectors is orthogonal to ?

Use the 2-norm.

**e.** What is the angle (in degrees) between vectors and ? Use the 2-norm.

**i.** 0 **ii.** 45 **iii.** 60 **iv.** 90 **v.** 120

**f.** Find the **cosine** of the angle between vectors and . **Hint**:

Use the 2-norm.  **i.** 0 **ii.** **iii.** **iv.** **v.**

**Problem 2: Curve Fitting:** Six data points have these *x*-values and *y*-values: and **.**

The plot shows these data points and both the best-fit **line**

and the best-fit **parabola**.



**a.** Record the design matrix *D* you would use

to find the best-fit **line**:

**b.** The product for your design matrix is: .

6

What is the value of c? *c* =

The inverse of is:

**c.** Find the inverse of

and place it in the adjacent box.

**d.** Solve the normal equation to find the vector with the best-fit parameters for the line.

Parameter vector .

Here'sfor free!Use it!

**e.** It can be shown that the best-fit **line** gives the estimates

. **i.** Find the **error** vector: . **ii.** Then give the missing value *k* for the

**ii.**

**Error vector:**

114

**i.**

where

Parabolic design matrix *D*:

Best parabola is:

.

Not required.

**f.** Let's start over and try a **parabolic** fit. Record the

new design matrix *D* you would use to find

the best-fit **parabola**: