

**Hello.** Please write DNE in a blank if the described object does not exist or if the indicated operation cannot be performed.

**C1:** Show no work.

**Z15**

Prof. King believes that writing in complete, coherent sentences is crucial in communicating Mathematics, improves posture, and whitens teeth.  one:

True! Yes! wH'at S a? sEnTENcE

**a**

Repeating decimal  $.41\overline{02}$  equals  $\frac{n}{d}$ , where posints  $n \perp d$  are  $n = \underline{\dots\dots\dots}$  and  $d = \underline{\dots\dots\dots}$ .

**b25**

A map  $L: \mathbf{V} \times \mathbf{E} \rightarrow \mathbf{W}$  (where  $\mathbf{V}, \mathbf{E}, \mathbf{W}$  are  $\mathbb{R}$ -VSeS) is bilinear if  $[QFN]$   $\vdots$   $\underline{\dots\dots\dots}$

An *inner product*  $\langle \cdot, \cdot \rangle$  is a map  $\mathbf{V} \times \mathbf{V} \rightarrow \mathbb{R}$  st.  $[QFN]$

I1:

I2:

I3:

**c**

MS  $(X, d)$  is *totally-disconnected* IFF (Defn.)

$\vdots$   $\underline{\dots\dots\dots}$   $\vdots$

**d**

Let  $\mathbf{v} := (2, -1, 2, 2, 2, 2) \in \mathbb{R}^6$ ; so  $\|\mathbf{v}\|_4 = \underline{\dots\dots\dots}$ .

**e**

Let  $f: \mathbb{R} \rightarrow \mathbb{R}$  by  $f(x) := [x+1]^2 - 3$ . Define restrictions  $g := f|_{[-5,2]}$  and  $h := f|_{[0,1]}$ . Then the sup-norm  $\|g\|_{\sup} = \underline{\dots\dots\dots}$  and  $\|h\|_{\sup} = \underline{\dots\dots\dots}$ .

**f**

Using the stereographic-metric on  $\mathbb{R}$ :

$\sigma(-1, 0) = \underline{\dots\dots\dots}$ ,  $\sigma(\infty, 0) = \underline{\dots\dots\dots}$ . For  $u \in \mathbb{R}_+$ ,

distance  $\sigma(-u, u) = \underline{\dots\dots\dots} = \text{Formula}(u)$ .

*Essay question: Carefully write a triple-spaced essay solving the problem.*

**C2:** We have seqs  $\vec{x}, \vec{y} \subset \mathbb{R}$  with  $\lim(\vec{x}) = 2$  and  $\lim(\vec{y}) = 4$ . Letting  $p_n := x_n \cdot y_n$ , give a rigorous  $\varepsilon$ -proof that  $\lim(\vec{p}) = 8$ .

(Do not restate the problem. You may quote, without proof, this theorem: If  $\vec{b}$  convergent, then  $\text{Diam}(\text{Range}(\vec{b})) < \infty$ .)

End of Class-C

**C1:**  $\underline{\dots\dots\dots}$  140pts

**C2:**  $\underline{\dots\dots\dots}$  85pts

Poorly stapled, or missing ordinal :  $\underline{\dots\dots\dots}$  -5pts

Missing name, or honor sig :  $\underline{\dots\dots\dots}$  -5pts

**Total:**  $\underline{\dots\dots\dots}$  225pts

Please PRINT your name and ordinal. Ta:

Ord:  $\underline{\dots\dots\dots}$

$\vdots$

$\vdots$