ACT
MAA4211 7222

Class-C

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

C4: [105pts] Show no work.

z_5 Our continuation-course, section # 3009, meets at the same time, 7th period, but in a different room. Circle one:

True! **Yes!** **You mean I don't already *know* Everything?!**

a Define Ω:= ____________ $\subset \mathbb{R}$ st. the Ω-*closed* ball $C := \Omega\text{-CldBal}_5(0) =$ ____________ satisfies $C \supsetneqq \text{Itr}_\Omega(C)=$ ____________ $\supsetneqq \Omega\text{-Bal}_5(0)=$ ____________.

b Using the stereographic-metric on $\dot{\mathbb{R}}$: $\boldsymbol{\sigma}(-1,0)=$ ________, $\boldsymbol{\sigma}(\infty,0)=$ ________. For $u \in \mathbb{R}_+$, distance $\boldsymbol{\sigma}(-u,u)=$ ____________ = Formula(u).

c_{10} Use $\boldsymbol{\alpha}$ and $\boldsymbol{\sigma}$ for the arctan & stereogr. metrics. With $b_n :=$ ____________, seq $\vec{\mathbf{b}} \subset \mathbb{R}$ is $\boldsymbol{\alpha}$-Cauchy but not $\boldsymbol{\sigma}$-Cauchy. With $c_n :=$ ____________, sequence $\vec{\mathbf{c}} \subset \mathbb{R}$ is $\boldsymbol{\sigma}$-Cauchy but not $\boldsymbol{\alpha}$-Cauchy.

d_{10} Let $f{:}\mathbb{R}\to\mathbb{R}$ by $f(x) := [x-1]^2 - 3$. Define restrictions $g := f\!\downharpoonleft_{[-1,2]}$ and $h := f\!\downharpoonleft_{[-2,2]}$. Then the sup-norm $\|g\|_{\sup}=$ ____________ and $\|h\|_{\sup}=$ ____________.

e MS (Ω, d) has $Y \subset \Omega$. So (Y, d) is ***cluster-point compact*** IFF [Put Ω- or Y- before "closed/open/interior" etc.]

____

____.

____

______________________________. And $\mathbb{Q} \cap [3,5]$ is cluster-point compact: Circle: **True** **False**

f That 5 is a ***Lebesgue number*** of open-cover $\mathcal{C}$ of (Ω, d), means that ____________________

____.

____

C5: [35pts] *Essay question, triple-spaced* (*Do not restate the problem*)*:*

We have sequences $\vec{\mathbf{x}}, \vec{\mathbf{y}} \subset \mathbb{R}$ with $\lim(\vec{\mathbf{x}}) = 2$ and $\lim(\vec{\mathbf{y}}) = 5$. Letting $p_n := x_n + y_n$, give a rigorous ε-proof that $\lim(\vec{\mathbf{p}}) = 7$.

(You may quote, without proof, this result: *If* $\vec{\mathbf{b}}$ *convergent, then* $\vec{\mathbf{b}}$ *is Cauchy. A fortiori,* $\text{Diam}\big(\text{Range}(\vec{\mathbf{b}})\big) < \infty$.)

End of Class-C