ACT
MAA4211 7222

Class-B

Prof. JLF King
31Aug2015

B-Home: ___ ___ ___ 198pts

B4: ___ ___ 65pts

B5: ___ ___ 35pts

No name, or no honor code: ___ −5pts

Unstapled, or no ordinal : ___ −5pts

Total: ___ ___ ___ 298pts

Please PRINT your Name

....

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

All MSes, here, are subspaces of $\mathbb{R}$.

B4: Show no work.

___ ___ z_5 The author of our text is Circle: **Archimedes** **Bubba** **Buck** **Doker** **Euler** **Machen** **Rosenlicht**

___ ___ a_{10} Repeating decimal $0.7\overline{20}$ equals $\frac{n}{d}$, where posints $n \perp d$ are n= .... and d= ....

___ ___ b_{10} Define X:= .... $\subset \mathbb{R}$ st. the X-open ball $B := X\text{-Bal}_3(0) =$ .... satisfies $B \subsetneqq \text{Cl}_X(B)$= .... $\subsetneqq X\text{-CldBal}_3(0)$= ....

___ ___ c_{10} With $\boldsymbol{\alpha}(\cdot,\cdot)$ the arctan metric on $\mathbb{R}$, the $\boldsymbol{\alpha}$-Diam(PRIMES)= ....
[*Hint:* No $\boldsymbol{\alpha}()$ should appear in your ans. But arctan() can.]

___ ___ d_{15} Sets A:= .... and B:= .... have $\partial_{\mathbb{R}}(A)$= .... and $\partial_{\mathbb{R}}(B)$= .... Moreover,
.... $= \partial_{\mathbb{R}}(A) \cap \partial_{\mathbb{R}}(B) \subsetneqq \partial_{\mathbb{R}}(A \cap B)$= ....

___ ___ e_{15} Sets C:= .... and D:= .... have $\partial_{\mathbb{R}}(C)$= .... and $\partial_{\mathbb{R}}(D)$= .... Further,
.... $= \partial_{\mathbb{R}}(C) \cap \partial_{\mathbb{R}}(D) \supsetneqq \partial_{\mathbb{R}}(C \cap D)$= ....

Essay question:

B5: In $\mathbb{R}$: Prove, for all sets $E_1, E_2 \subset \mathbb{R}$, that

1: $$\partial(E_1) \cup \partial(E_2) \supset \partial(E_1 \cap E_2).$$

[*Hint:* Fixing a point $q \in \partial(E_1 \cap E_2)$, we know there exist sequences $\vec{\mathbf{b}} \subset E_1 \cap E_2$ and $\vec{\mathbf{x}} \subset [E_1 \cap E_2]^c$ converging to q. You need to show, either for j=1 or j=2, that ${E_j}^c$ includes a sequence $\vec{\mathbf{y}}$ that converges to q. Also, explain *why* the existance of such a $\vec{\mathbf{y}}$ is sufficient to establish (**??**).]

HONOR CODE: *"I have neither requested nor received help on this exam other than from my professor."*

Signature: ....