Ord: ___ ___

Calc III
MAC2313 3191

Z-class

Prof. JLF King
Touch: 4Aug2016

Note. Do ***not*** approx.: If your result is "$\sin(\sqrt{\pi})$" then write that rather than .9797$\cdots$. Write expressions unambiguously e.g, "$1/a+b$" should be bracketed either $[1/a]+b$ or $1/[a+b]$. (Be careful with **negative** signs!) Use lb for pound(s), mi for mile(s), mph for miles-per-hour, and ppf for parsecs-per-fortnight.

Z3: Show no work.

___ z Professor King sometimes gives freebie questions. *Circle one:* **True** **Right On!** ***Who?***

___ a Let β denote the angle between a hyperdiagonal and an edge of a regular octahedron. Then $\cos(\beta)=$ _____.

___ b The distance from Plane$(2\hat{\imath}, 2\hat{\jmath}, 2\hat{\mathbf{k}})$ to the point $12\hat{\mathbf{k}}$ is _____.
[*Hint:* Can you do this "by inspection"?]

___ c̀ In $\mathbb{R}^4$, consider the line $\mathbb{L}$ passing through points $P := (2,3,1,0)$ and $Q := (0,-1,0,3)$. Then (___ , ___ , ___ , ___) is the closest point on $\mathbb{L}$ to the origin.

___ d The *radius-of-curvature* of the exponential curve $x \mapsto \mathsf{e}^x$ at $(0,1)$ is RoC= _____.

___ è On a certain uniform-density radius=300mi planetoid you weigh $P \cdot$ lb. You climb a 100mi tall tower and now weigh ___ lb.

You descend to the bottom of a 100mi deep hole and you now weigh ___ lb.

___ f̈ The dark planet Malfoy has two satellites in circular orbit, Crabbe and Goyle. Crabbe's orbital-speed is 800mph and his orbital-radius is 18000mi. Goyle's orb-speed is 1200mph, so his orb-radius is _____ mi.

Out in Crabbe's orbit, the from-Malfoy escape-speed is _____ mph.

(You may express this answer as an arithmetic combination of $800, 18000, 1200$ and other numbers.)

Bonus: (continued) Malfoy's radius is $\frac{18000}{6}$mi. How fast must a projectile be fired (straight up, from the planet's surface) so as to *just reach* Crabbe's orbit?
Projectile speed= _____ mph.

End of Z-class

Z-home:	___ ___ ___	255pts
Z3:	___ ___ ___	130pts
Bonus:	___ ___	10pts
Total:	___ ___ ___	385pts

Honor Code: *"I have neither requested nor received help on this exam other than from my professor (or his colleague)."*
Name/Signature/Ord

Ord: _____ ___