

Note. Do **not** approx.: If your result is “ $\sin(\sqrt{\pi})$ ” then write that rather than .9797... 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.

Z4: 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 $\text{Plane}(2\hat{i}, 2\hat{j}, 2\hat{k})$ to the point $12\hat{k}$ is _____.
[Hint: Can you do this “by inspection”?]

c On a certain uniform-density radius=300mi planetoid you weigh $P \cdot \text{lb}$. You climb a 100mi tall tower and now weigh $\frac{1}{2}P \cdot \text{lb}$.
You descend to the bottom of a 100mi deep hole and you now weigh _____ lb .

d The dark planet MALFOY has two satellites in circular orbit, CRABBE and GOYLE. CRABBE’s orbital-speed is 1000mph and his orbital-radius is 18000mi. GOYLE’s orbital-speed is 1500mph, so his orbital-radius is _____ mi.
Out in CRABBE’s orbit, the from-MALFOY escape-speed is _____ mph.
(You may express your answer as an arithmetic combination of 1000, 1500, 18000 and other numbers.)

e In \mathbb{R}^4 , consider the line \mathbb{L} passing through points $P := (2, 3, 1, 0)$ and $Q := (-1, 0, -5, 3)$. Then $(\text{_____}, \text{_____}, \text{_____}, \text{_____})$ is the closest point on \mathbb{L} to the origin.

f The quadratic surface $x^2 + y^2 + 2y = 6z - z^2$ is a/an/the: **Circle** one:

- Hufflepuff-Hume—study-lounge
- Cylinder-over-a-parabola
- Paraboloid
- Firebolt-2000-racingbroom
- Saddle-surface
- 2-sheeted-hyperboloid
- 1-sheeted-hyperboloid
- Gryffindor-student
- Ellipsoid
- Single-point
- Empty-set
- Blast-ended Skrewt

[Hint: Most of these are improbable...]

End of Z-class

Z-home: _____ 350pts

Z4: _____ 170pts

Total: _____ 520pts

HONOR CODE: “I have neither requested nor received help on this exam other than from my professor (or his colleague).”
Name/Signature/Ord

Ord: _____