Reminder Suppose $f(x, y, z)$ is defined in a region $\mathcal{R}$ of $\mathbb{R}^3$. The average value of f over $\mathcal{R}$ is $\iiint_{\mathcal{R}} f(x, y, z)\, dv$ divided by $\iiint_{\mathcal{R}} 1\, dv$.

The bat flies ... A bat flies in and around a hemispherical cave, with water at the bottom, so it cannot land there. If the radius of the cave is R, what is the average height of the cave to the bat?

> I have been urged by a legalistic and unpoetic colleague to add: "The bat flies totally at random throughout all of the space available to it." The colleague then remarked (while talking to me), "Of course, they've had you all semester, so they know what to expect." What could she have meant?

Reminder (maybe) Suppose $f(x, y, z)$ is defined on a surface $\mathcal{S}$ in $\mathbb{R}^3$. The average value of f over $\mathcal{S}$ is $\iint_{\mathcal{S}} f(x, y, z)\, dS$ divided by $\iint_{\mathcal{R}} 1\, dS$.

The slug crawls ... A *non-swimming* slug crawls about on the inner surface of the same cave as described above). Its motion is confined to that surface of the cave. What is the average height of the cave to the slug?

> Please add (sigh!): "The slug crawls totally at random throughout all of the space available to it."

Which creature is higher (on average)?