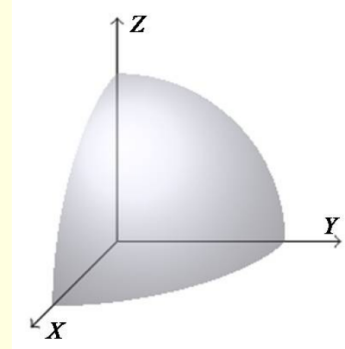## Ques1.

The value of the integral $\int_V (x^2 + y^2 + z^2)\, d\tau$, where V is the volume of a positive octant sphere (of radius 1) as shown in the figure, is π/n. The value of n is [10]. Provide answer in the integer form.


Ques2.

The value of the closed loop line integral $\oint(x^2 y\, dx + 2xy\, dy)$ in a counterclockwise direction (as viewed from $+Z$-axis) around the perimeter of the rectangle defined by $x = \pm 3, y = \pm 5$ is [-180]. Provide the answer in integer form.

Ques3.

The value of the surface integral $\int_S(\vec{\nabla} \times \vec{A}) \cdot d\vec{a}$ for the vector $\vec{A} = xy\,\hat{i} + 2yz\,\hat{j} + 3xz\,\hat{k}$, using the triangular area in the YZ plane (see figure), is [-2.67]. Round off the answer to two decimal places.
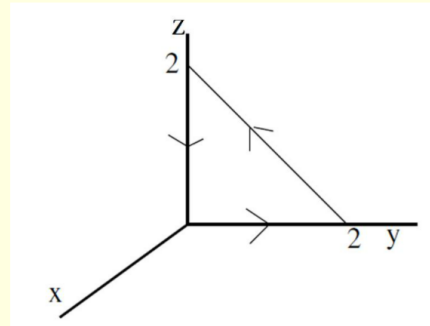
Ques4.

The value of the integral
$I = \int_V \{r^4 + r^2(\vec{r} \cdot \vec{c}) + c^4\}\, \delta(\vec{r} - \vec{c})\, d\tau$,
where V is the volume of a sphere of radius 6 about the origin and $\vec{c} = 5\hat{i} + 3\hat{j} + 2\hat{k}$ and its magnitude $|\vec{c}| = c$, is [0]. Round off the answer to the nearest integer.