Multivar Quiz #4

Wednesday, October 7, 2020 9:10 PM

Problem 8

Honor Pledge:

"I have neither given nor received any illegal aid on this exam"

-Saaif Ahmed 10/7/20

Find the volume of the region contained below the paraboloid $z = 19 - x^2 - y^2$ and above the paraboloid $z = 1 + x^2 + y^2$.

$x^2 + y^2 = 19$

so r is $\sqrt{19}$

$z - (z - V) = V$

$z_1 - z_2 = 18 - 2x^2 - 2y^2 = 18 - 2(x^2 + y^2)$

$$\int_0^{2\pi} \int_0^{\sqrt{19}} (19 - r^2) r \, dr d\theta - \int_0^{2\pi} \int_0^{\sqrt{19}} \left(18 - 2(r^2)\right) r \, dr d\theta$$

$$\frac{361\pi}{2} - (-19\pi) = \frac{399\pi}{2}$$

Answer: $\frac{399\pi}{2}$