

Quiz 8

Name: _____ Section and/or TA: _____

Answer all questions in a clear and concise manner. Unsupported answers will receive *no credit*.

1. (3 points) Set up but **DO NOT** evaluate $\iiint_E (2x - y + z) dV$, using cylindrical coordinates where E is the solid in the **first octant** that lies under the paraboloid $z = 9 - x^2 - y^2$.

Solution: $\iiint_E z dV = \int_0^{\pi/2} \int_0^3 \int_0^{9-r^2} (2r \cos(\theta) - r \sin(\theta) + z)r dz dr d\theta.$

2. (2 points) The point $(0, 2\sqrt{3}, -2)$ is given in rectangular coordinates. Find the spherical coordinates for this point.

Solution: $\rho = \sqrt{x^2 + y^2 + z^2} = \sqrt{0 + 12 + 4} = 4$
 $\cos(\phi) = \frac{z}{\rho} = \frac{-2}{4} = \frac{-1}{2}$ implies $\phi = \frac{2\pi}{3}$.
 $\cos(\theta) = \frac{x}{\rho \sin(\phi)} = 0$ implies $\theta = \frac{\pi}{2}$.

Therefore the spherical coordinates of the given point is $(4, \pi/2, 2\pi/3)$.