

Quiz 9

Name: _____ Section and/or TA: _____

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

1. (2 points) The point $(0, 2\sqrt{3}, -2)$ is given in rectangular coordinates. Find the spherical coordinates for this point.

$$\text{Solution: } \rho = \sqrt{x^2 + y^2 + z^2} = \sqrt{0 + 12 + 4} = 4$$

$$\cos(\phi) = \frac{z}{\rho} = \frac{-2}{4} = \frac{-1}{2} \text{ implies } \phi = \frac{2\pi}{3}.$$

$$\cos(\theta) = \frac{x}{\rho \sin(\phi)} = 0 \text{ implies } \theta = \frac{\pi}{2}.$$

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

2. (3 points) Set up but **DO NOT** evaluate $\iiint_E z \, dV$, where E is the solid tetrahedron bounded by the four planes $x = 0$, $y = 0$, $z = 0$, and $x + y + z = 1$.

$$\text{Solution: } \iiint_E z \, dV = \int_0^1 \int_0^{1-x} \int_0^{1-x-y} z \, dz \, dy \, dx.$$