

# Math 241: Quiz 12

Show ALL Work

Name \_\_\_\_\_ Answers \_\_\_\_\_

1. Fill in the 6 boxes below to correctly complete interchanging the order of integration.

$$\int_0^3 \int_0^{\sqrt{9-x^2}} \int_{-\sqrt{9-x^2-y^2}}^{\sqrt{9-x^2-y^2}} f(x, y, z) dz dy dx$$
$$= \int_{\boxed{-3}}^{\boxed{3}} \int_{\boxed{0}}^{\boxed{\sqrt{9-z^2}}} \int_{\boxed{0}}^{\boxed{\sqrt{9-x^2-z^2}}} f(x, y, z) dy dx dz$$

2. Fill in the 6 boxes below to correctly convert the integration using rectangular coordinates to an integration using spherical coordinates.

$$\int_0^3 \int_0^{\sqrt{9-x^2}} \int_{-\sqrt{9-x^2-y^2}}^{\sqrt{9-x^2-y^2}} f(x, y, z) dz dy dx$$
$$= \int_{\boxed{0}}^{\boxed{\pi/2}} \int_{\boxed{0}}^{\boxed{\pi}} \int_{\boxed{0}}^{\boxed{3}} f(\rho \sin \phi \cos \theta, \rho \sin \phi \sin \theta, \rho \cos \phi) \rho^2 \sin \phi d\rho d\phi d\theta$$