HOMEWORK 3

Exercise 1. Recall that conversion from Cartesian coordinates to spherical coordinates is given by the relationships

$$\begin{aligned} x &= \rho \sin\phi \cos\theta \\ y &= \rho \sin\phi \sin\theta \\ z &= \rho \cos\phi. \end{aligned}$$

Use these relationships and the Jacobian determinant to show that the volume element, dV, in spherical coordinates takes the form

$$dV = \rho^2 \sin\phi d\rho d\phi d\theta.$$

If you can't remember how to evaluate a 3×3 determinant, remember that the internet is a useful resource for mathematical information. Or you can find a friend who is good at these things to help remind you.

Do the following exercises from the book: Pages 871-873, #6, 8, 48, 58, 60.