Math 214 Hwk 10

Problem 1. *Compute*

$$\int_0^2 \int_x^2 x\sqrt{1+y^3}\, dydx.$$

Problem 2. *Compute*

$$\int_0^1 \int_y^1 \sin(x^2)\, dxdy.$$

Problem 3. *Find the area of the surface given by $z = f(x,y)$ over the region R, where*

$$f(x,y) = \sqrt{a^2 - x^2 - y^2} \quad \textit{and} \quad R = \{(x,y) \mid x^2 + y^2 \le a^2\}.$$

Problem 4. *Find the mass of the sphere of radius R whose density at a given point is proportional to the distance between the point and the z-axis.*

Problem 5. *Consider a cone of uniform density, radius R and height h.*

(a). *Find the volume of the cone.*

(b). *Find the center of mass of the cone.*

(c). *Find the moment of inertia of the cone rotating about its azmuth.*

$$\textit{Answer:} \quad I_0 = \frac{3MR^4}{10}.$$

Problem 6. *Use the change of variables to evaluate the double integral*

$$\iint_R \frac{\sqrt{x+y}}{x}\, dxdy,$$

where

$$x = u \qquad y = uv,$$

and R is the triangle with vertices $(0,0), (4,0), (4,4)$.