Assignment 4

Physics 321
Electrodynamics I

Due on Friday, September 13th, 2024

Class date: September 11th, 2024.
Reading: pp. 37–43, curvilinear coordinates.

Problem 8

The gradient operator acting on a function, ∇f, gives the direction of greatest increase of the function f. The unit vectors in any coordinate system point in the direction of greatest increase of the coordinate value. Taking $f = r \equiv \sqrt{x^2 + y^2 + z^2}$, show that the gradient of r is equal to the radial unit vector, $\hat{\mathbf{r}}$.

Problem 9

Evaluate:

$$\frac{d}{dx} \int_0^x h(y)\, dy, \tag{1}$$

express your answer in terms of $h(x)$ (hint: use the fundamental theorem of Calculus).