CSC 4780/6780
Fall 2022
Homework 2

August 28, 2022

1 Derive a gradient

Let $f : R^3 \rightarrow R$ be given by

$$f(x, y, z) = y \sin(5x) + e^{yz} + \ln z$$

What is the gradient?

Answer: $\nabla f = \begin{bmatrix} 5y\cos(5x) & ze^{yz} + \sin(5x) & ye^{yz} + \frac{1}{z} \end{bmatrix}$

Here is the sympy script that will solve this:

```
import sympy

x, y, z = sympy.symbols('x y z')
f = y * sympy.sin(5 * x) + sympy.exp(y * z) + sympy.log(z)

df_x = sympy.diff(f, x)
df_y = sympy.diff(f, y)
df_z = sympy.diff(f, z)
print(f"df/dx = {df_x}")
print(f"df/dy = {df_y}")
print(f"df/dz = {df_z}")
```