**Math 53, Discussions 116 and 118** **2022-10-05**

# More partial derivatives

## Questions

**Question 1.** Let $f(x, y) = ye^{xy}$. Use a linear approximation to approximate $f(0.01, 0.98)$.

**Question 2.** Find the tangent plane to the graph of the function $f(x, y) = 1 - \sin(x + y^2)e^{-y} - y$ at the point $(\pi, 0, f(\pi, 0)) \in \mathbb{R}^3$.

**Question 3.** Find the tangent plane to the surface

$$xy + yz + zx = 5$$

at the point $(1, 2, 1)$. Hint: You can solve for $z$ and then compute $\partial z/\partial x$ and $\partial z/\partial y$. Or you can compute these quantities via implicit differentation without explicitly solving for $z$. (Soon we'll learn yet another way of solving this problem, in §14.6.)

**Question 4.** Check that $x = 1$ solves the equation

$$x^7 - x^6 + 2x - 2 = 0.$$

Now consider the equation

$$x^7 - 1.03x^6 + 2.06x - 2 = 0.$$

Can you linearly approximate a solution to this equation, given that $x = 1$ solved the original equation?

## HW problems

Here are a couple of problems from the current assigned homework. Consider if you'd be willing to present a solution to one of them at the board!

**Problem** (§14.2 #13)**.** Find the limit if it exists, or show that the limit does not exist.

$$\lim_{(x,y)\to(0,0)} \frac{xy}{\sqrt{x^2 + y^2}}$$

**Problem** (§14.3 #29)**.** Find $F_x$ and $F_y$ if

$$F(x, y) = \int_y^x \cos(e^t)\,dt.$$