Brief solutions to selected problems in homework 08

1. Section 14.3: Solutions, common mistakes and corrections:

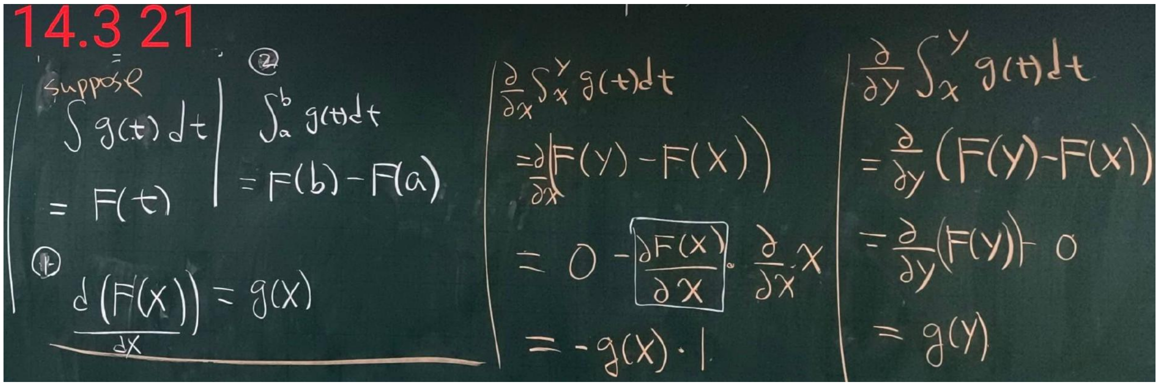

Figure 1: Solution to Section 14.3, problem 21

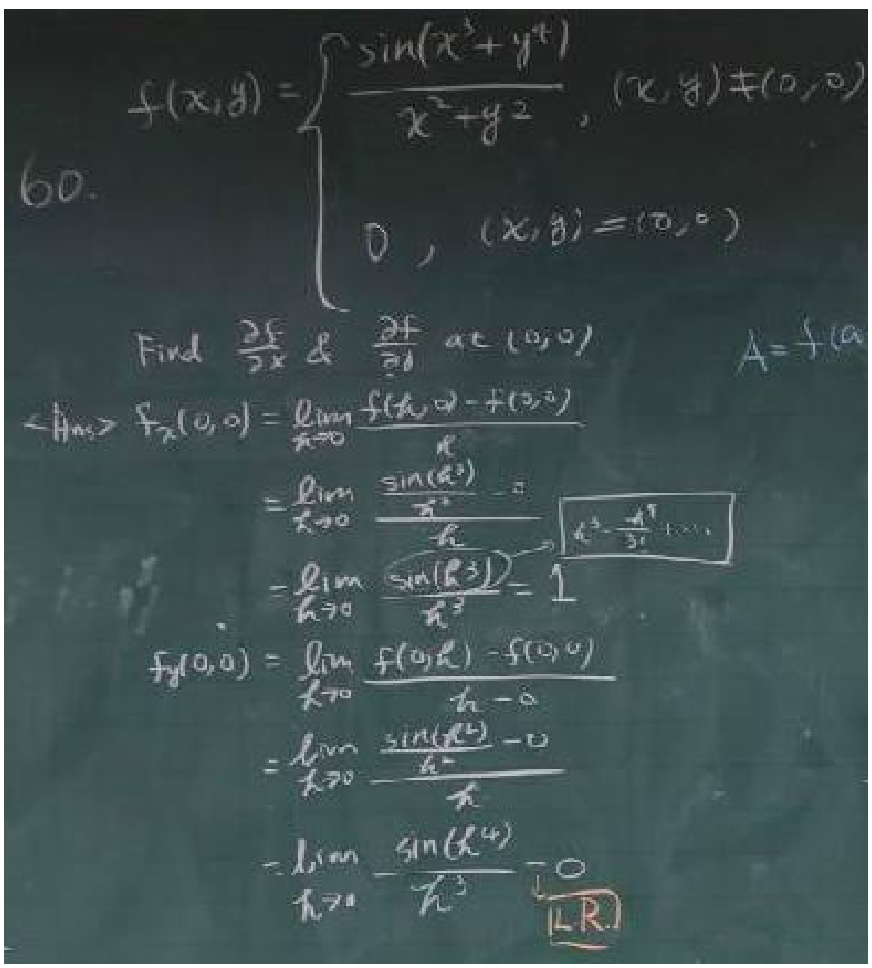

Figure 2: Solution to Section 14.3, problem 60

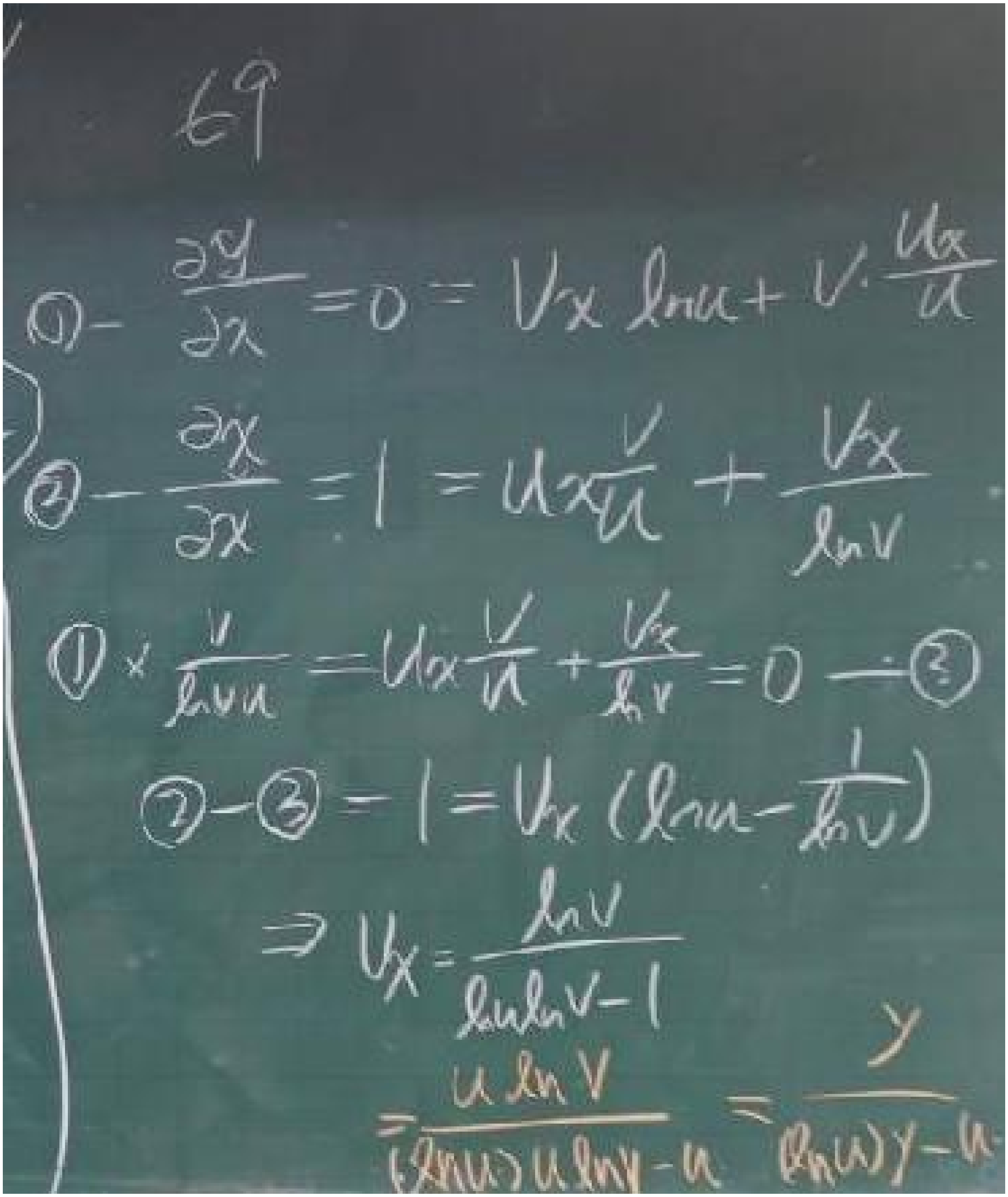

Figure 3: Solution to Section 14.3, problem 69

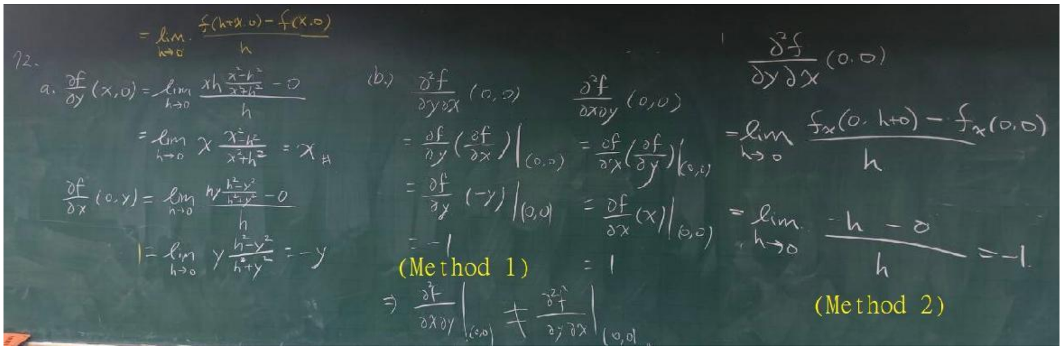

Figure 4: Solution to Section 14.3, problem 72

Remark: Method 2 is the correct way of calculating $f_{xy}(0,0)$. In contrast, method 1 calculates $\lim\limits_{y\to 0} f_x(0,y)$. Although they are the same in this problem, they need not be the same in general.

There are examples where $g'(0)$ exists but $\lim\limits_{y\to 0} g'(y)$ does not exist ($g(y) = y^2\sin(\frac{1}{y})$ for $y \neq 0$ and $g(0) = 0$).

To complete method 1, one needs to verify that $f_x(0,y)$ is continuous in y, then apply the Mean Value Theorem to $f_x(0,y)$ to conclude that $f_{xy}(0,0) = \lim\limits_{y\to 0} f_x(0,y)$ (more complicated).

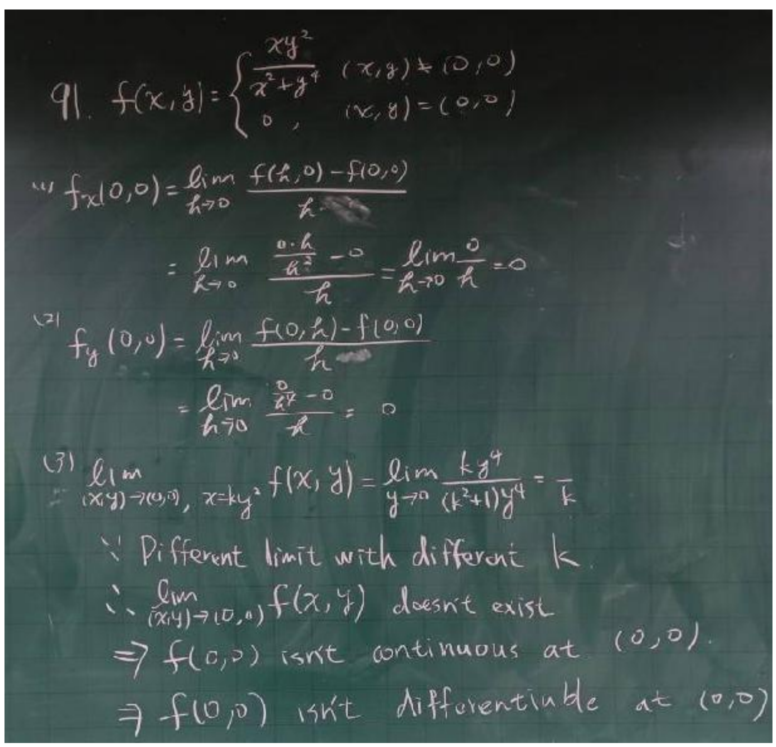

Figure 5: Solution to Section 14.3, problem 91

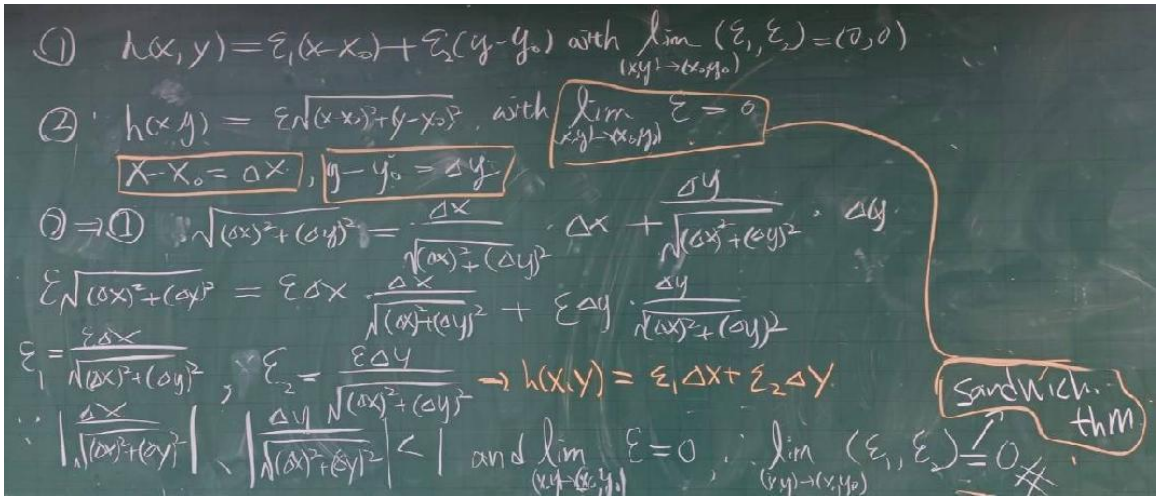

Figure 6: Solution to Homework 08, problem 2, part 1

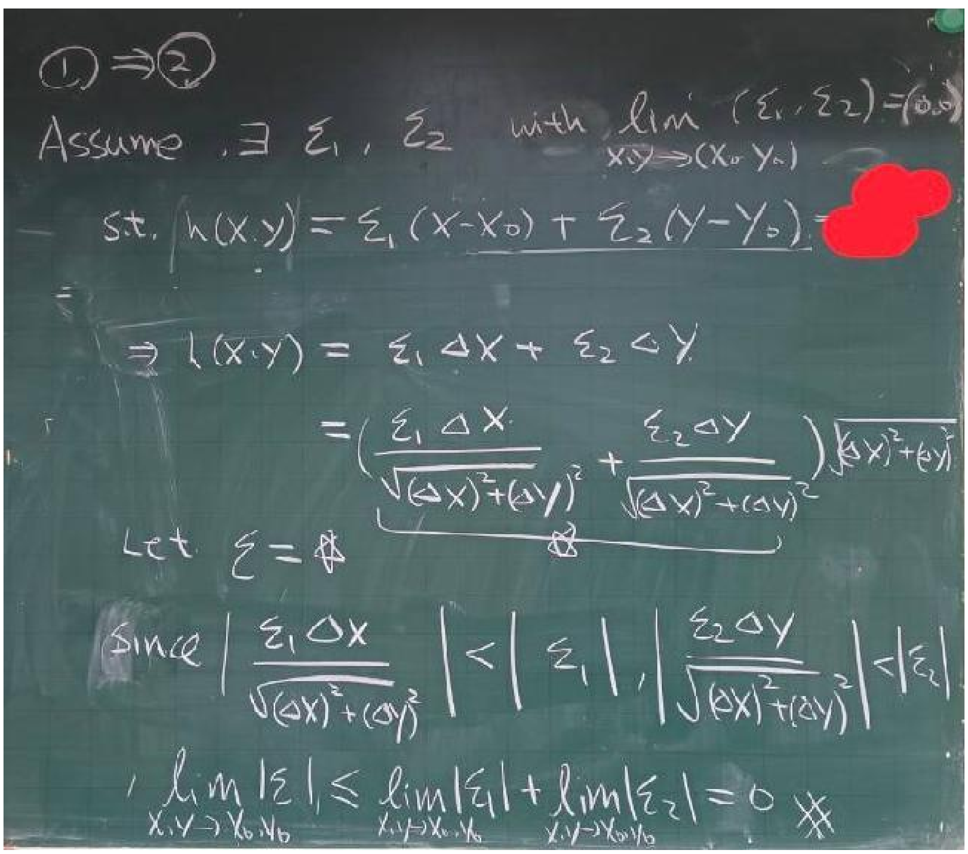

Figure 7: Solution to Homework 08, problem 2, part 2