Brief solutions to selected problems in homework 06

1. Section 3.11: Solutions, common mistakes and corrections:

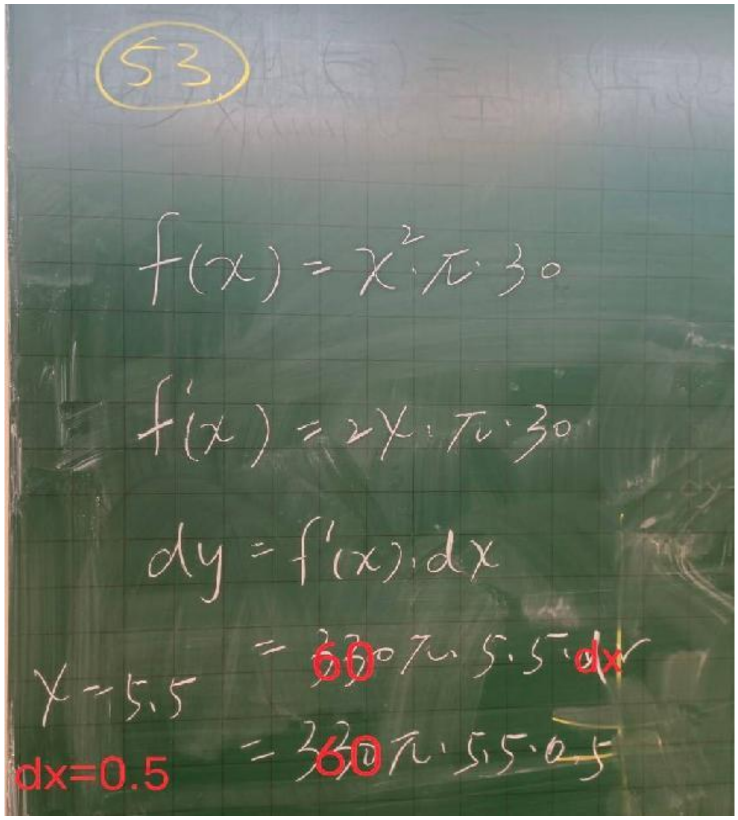

Figure 1: Solution to Section 3.11, problem 53 and some corrections

Remark:

"$dy = f'(a)dx$" is in the notation of "differential" which we skipped.

In the notation of linear approximation, the idea is:

Let $L(x) = f(a) + f'(a)(x-a)$ be the linear approximation of $f(x)$ near $x = a$,

$$f(x) \approx L(x) \implies \Delta f \approx \Delta L$$

where $\Delta f = f(x) - f(a)$ and $\Delta L = L(x) - L(a)$. It is easy to check by direct calculating that $L(x) - L(a) = f'(a)\Delta x$ where $\Delta x = x - a$.

Therefore

$$\Delta f \approx \Delta L = f'(a)\Delta x$$

Here $f(x) = \pi x^2 h = 30\pi x^2$, $a = 5.5$ and $\Delta x = 0.5$.

Note: $dy = f'(a)dx$ is just another way of saying $\Delta L = f'(a)\Delta x$.

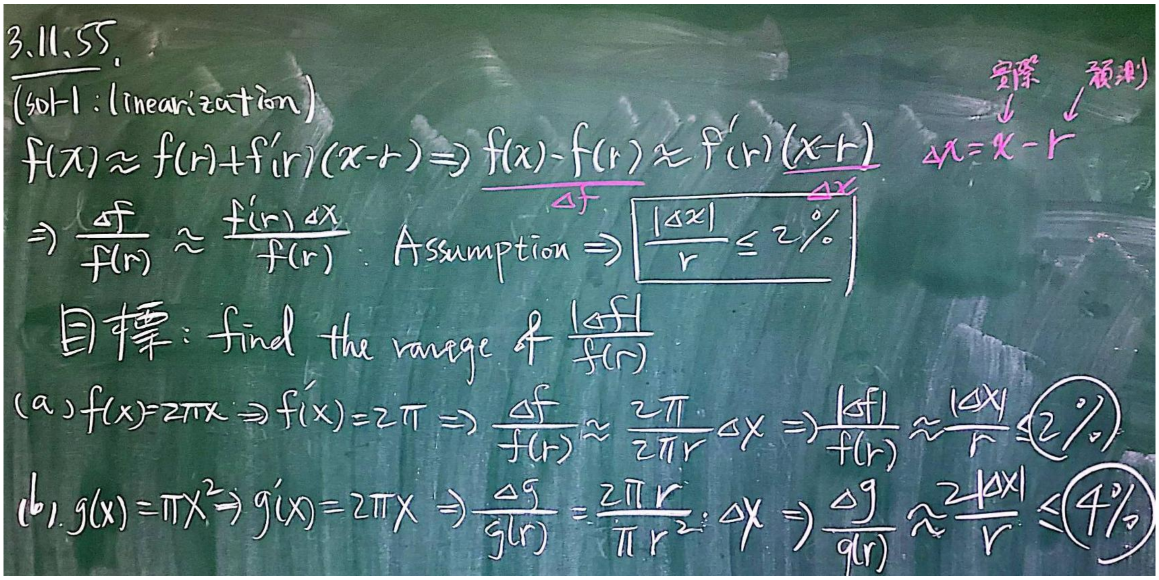

Figure 2: Solution to Section 3.11, problem 55. Note: Δg near the end should be $|\Delta g|$ instead

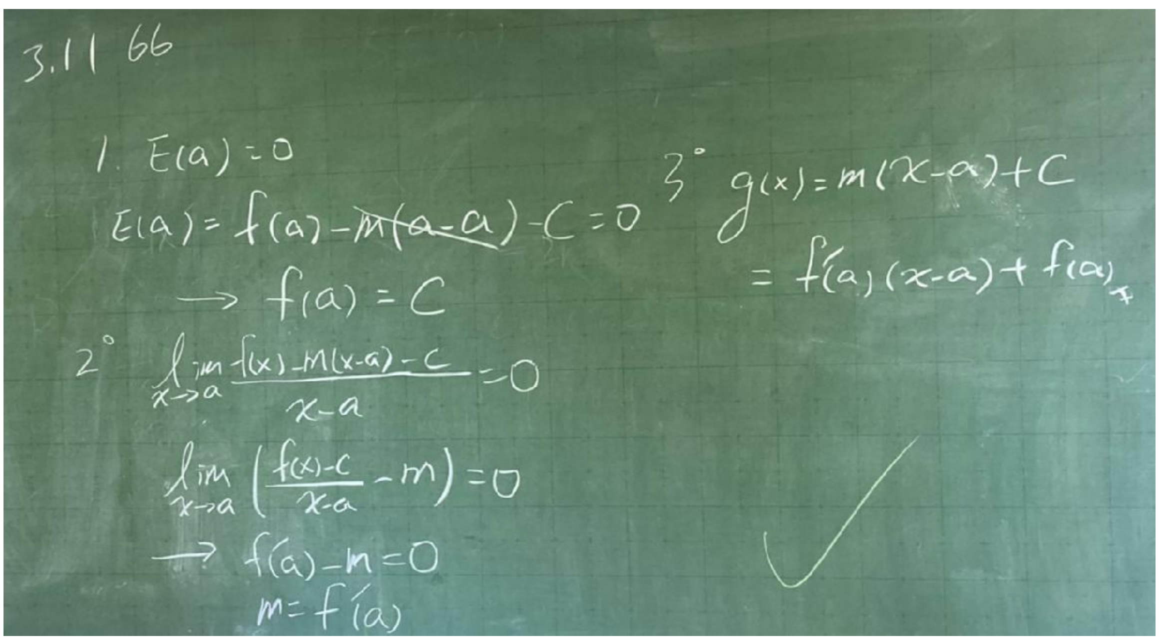

Figure 3: Solution to Section 3.11, problem 66

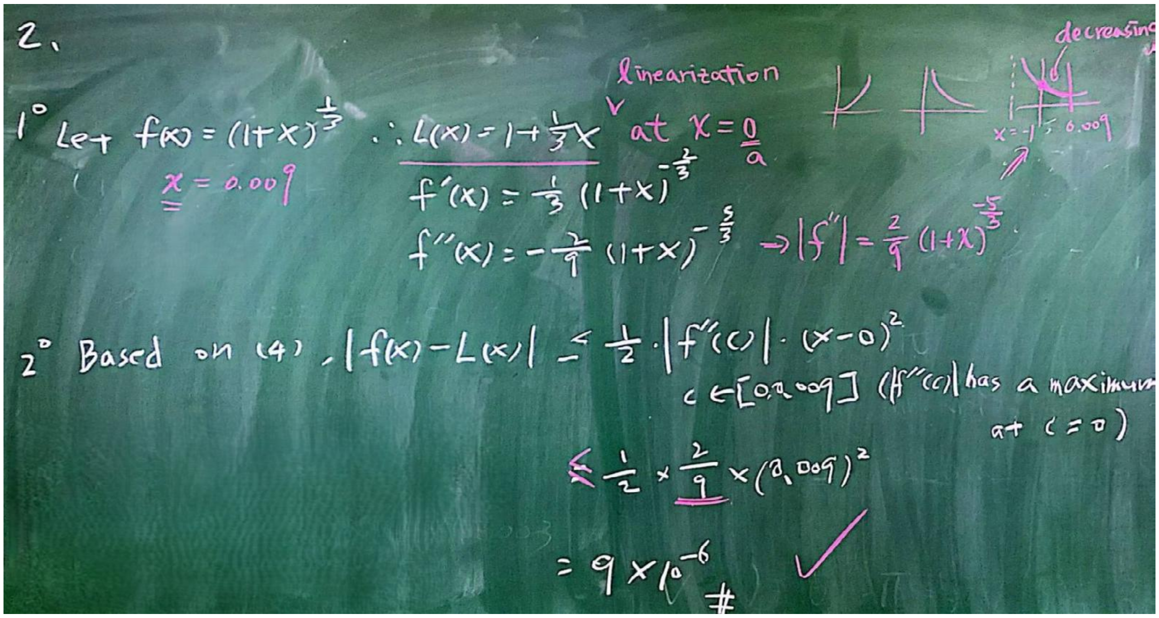

Figure 4: Solution to Homework 06, problem 2

2. Section 4.1: Solutions, common mistakes and corrections:

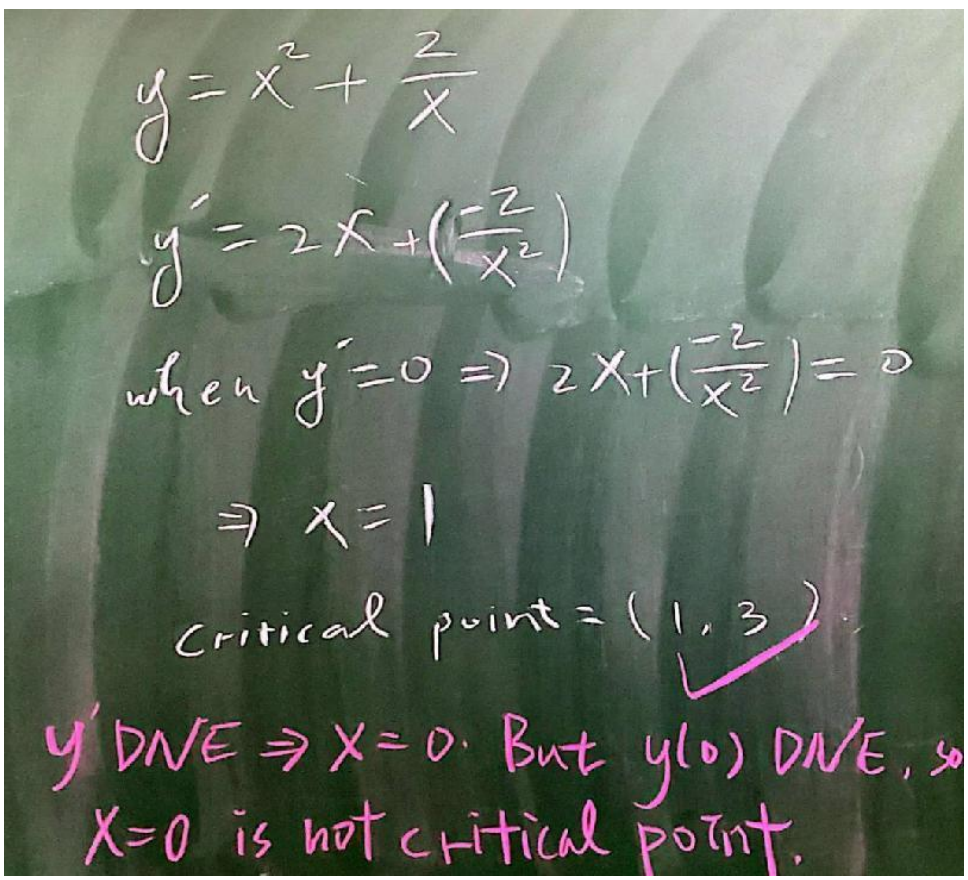

Figure 5: Solution to Section 4.1, problem 49

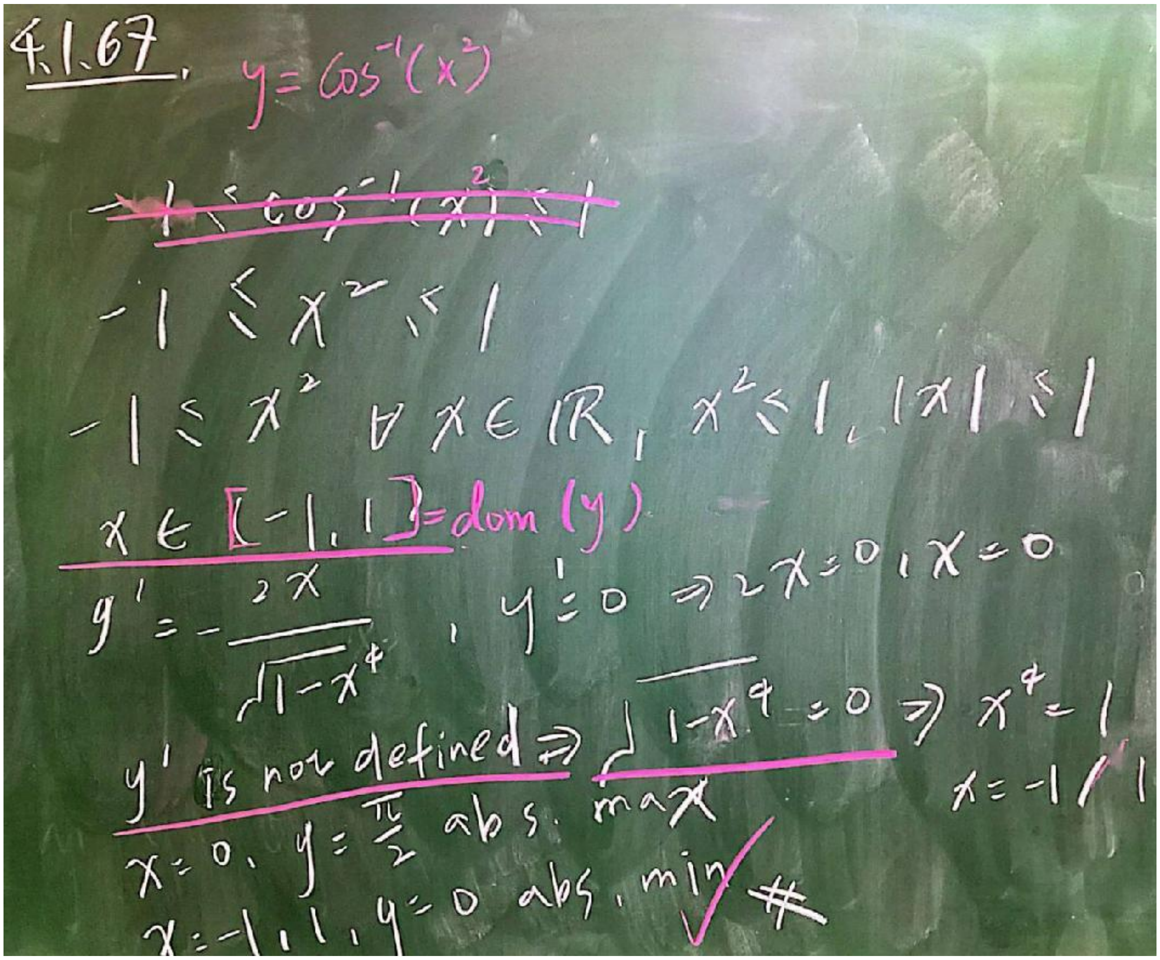

Figure 6: Solution to Section 4.1, problem 67

Figure 7: Solution to Section 4.1, problem 67. Note: $x = \pm 1$ are under consideration not because $f'(\pm 1)$ do not exist, but because $x = \pm 1$ are boundary points of domain of f.