

Brief solutions to selected problems in homework week 06

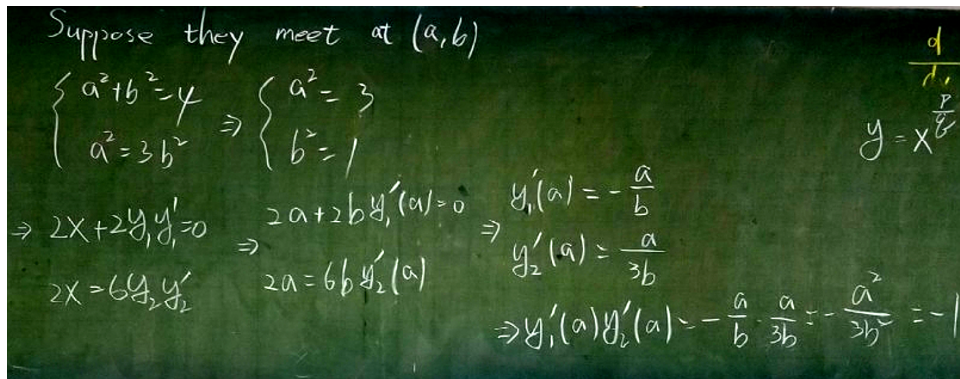
1. Section 3.7, problem 48 solution:

The image shows a handwritten derivation on a chalkboard. The steps are as follows:

$$y^q = x^p \quad y = x^{\frac{p}{q}}$$
$$q y^{q-1} y' = p x^{p-1}$$
$$y' = \frac{p}{q} \frac{x^{p-1}}{y^{q-1}}$$
$$= \frac{p}{q} x^{p-1 - (p - \frac{p}{q})}$$
$$= \frac{p}{q} x^{\frac{p}{q} - 1}$$

Figure 1: Section 3.7, problem 48

2. Section 3.7, problem 51(a) solution:



Suppose they meet at (a, b)

$$\begin{cases} a^2 + b^2 = 4 \\ a^2 = 3b^2 \end{cases} \Rightarrow \begin{cases} a^2 = 3 \\ b^2 = 1 \end{cases}$$

$\Rightarrow 2x + 2y y_1' = 0 \Rightarrow 2a + 2b y_1'(a) = 0 \Rightarrow y_1'(a) = -\frac{a}{b}$

$2x = 6y_2 y_2' \Rightarrow 2a = 6b y_2'(a) \Rightarrow y_2'(a) = \frac{a}{3b}$

$\Rightarrow y_1'(a) y_2'(a) = -\frac{a}{b} \cdot \frac{a}{3b} = -\frac{a^2}{3b^2} = -1$

$y = x^{\frac{d}{p}}$

Figure 2: Section 3.7, problem 51(a)