

## Brief solutions to selected problems in homework 12

### 1. Section 6.1: Solutions, common mistakes and corrections:

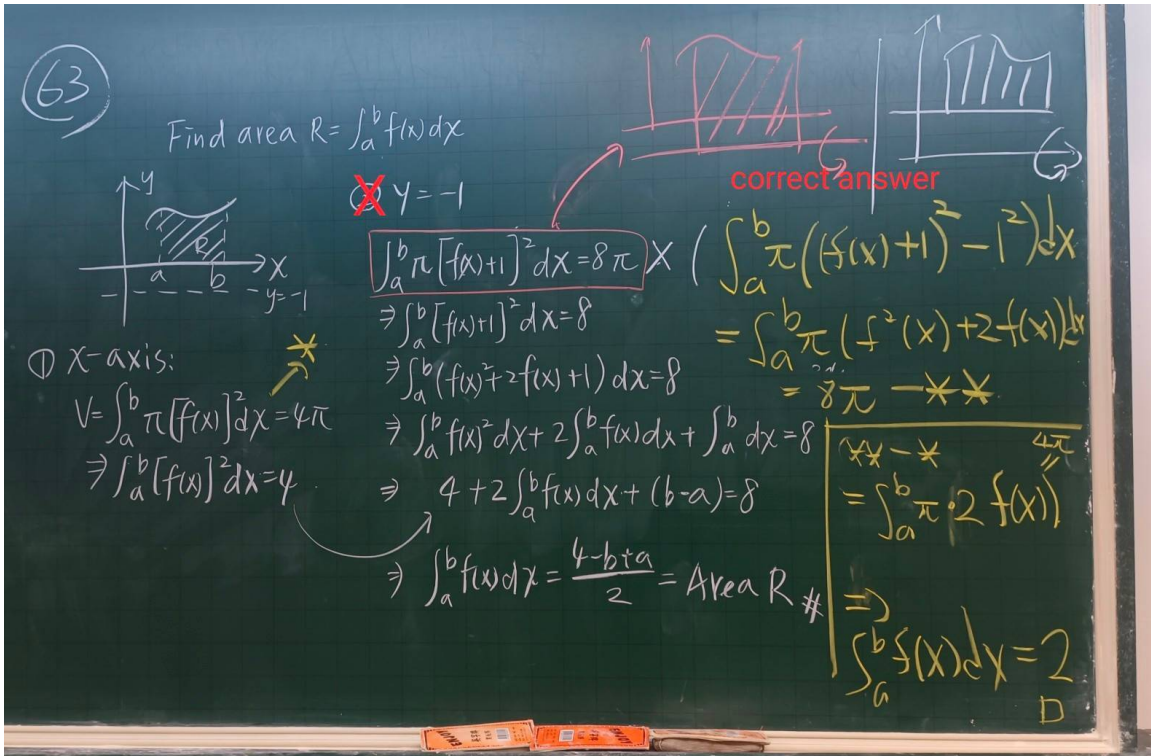


Figure 1: Solution to Section 6.1, problem 63

### 2. Section 6.3: Solutions, common mistakes and corrections:

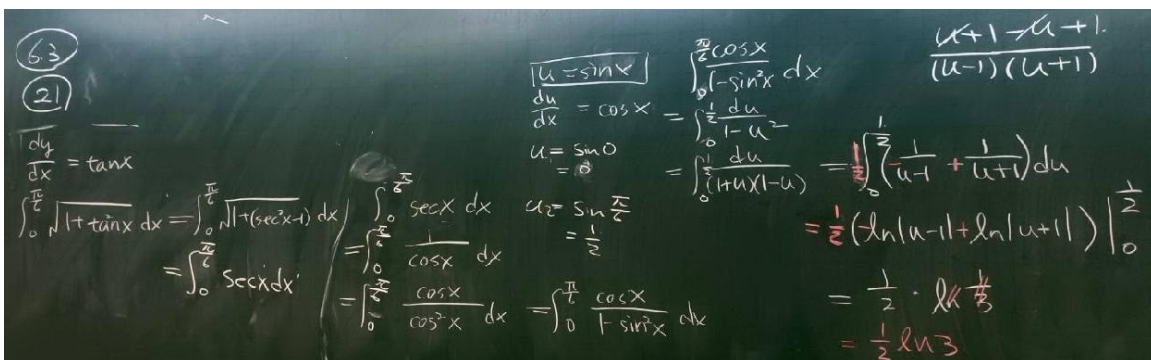


Figure 2: Solution to Section 6.3, problem 21

Sec 6-3

25  $y(x) = \int_0^x \sqrt{\cos 2t} dt$  by Fundamental thm of Calculus  $\Rightarrow y'(x) = \sqrt{\cos 2x}$

$\Rightarrow \int_0^{\frac{\pi}{4}} \sqrt{1+(y')^2} dx = \int_0^{\frac{\pi}{4}} \sqrt{1+\cos 2x} dx = \int_0^{\frac{\pi}{4}} \sqrt{2\cos^2 x} dx$

$(\because \cos x \geq 0 \text{ if } x \in [0, \frac{\pi}{4}]) = \sqrt{2} \int_0^{\frac{\pi}{4}} \cos x dx = \sqrt{2} \sin x \Big|_0^{\frac{\pi}{4}} = 1$

Figure 3: Solution to Section 6.3, problem 25

29.  $9x^2 = y(y-3)^2 \Rightarrow 18x dx = [(y-3)^2 + 2y(y-3)] dy$

$\Rightarrow 6x dx = (y-3)(y-1) dy$

$\Rightarrow 36x^2 dx^2 = (y-3)^2 (y-1)^2 dy^2$

$\Rightarrow dx^2 = \frac{(y-3)^2 (y-1)^2}{4 \cdot y(y-3)^2} dy^2$

$ds^2 = dx^2 + dy^2$

$= \frac{(y-1)^2}{4y} dy^2 + dy^2 = \left[ \frac{(y-1)^2 + 4y}{4y} \right] dy^2 = \frac{(y+1)^2}{4y} dy^2$

Figure 4: Solution to Section 6.3, problem 29