

Lecture 18 Worksheet

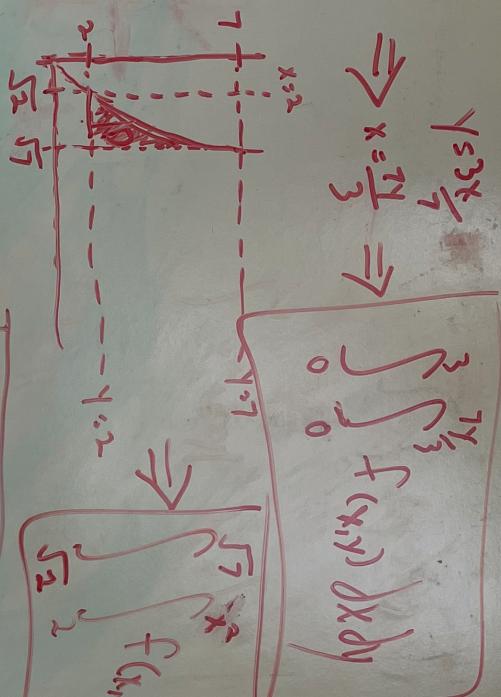
Charles Richardson

$$1. a. \int_0^7 \int_{3x/1}^3 f(x,y) dy dx \Rightarrow x = \frac{y}{3} \Rightarrow$$

$$\int_0^3 \int_0^{y/3} f(x,y) dx dy$$

$$b. \int_2^7 \int_{\sqrt{2}}^{\sqrt{y}} f(x,y) dx dy$$

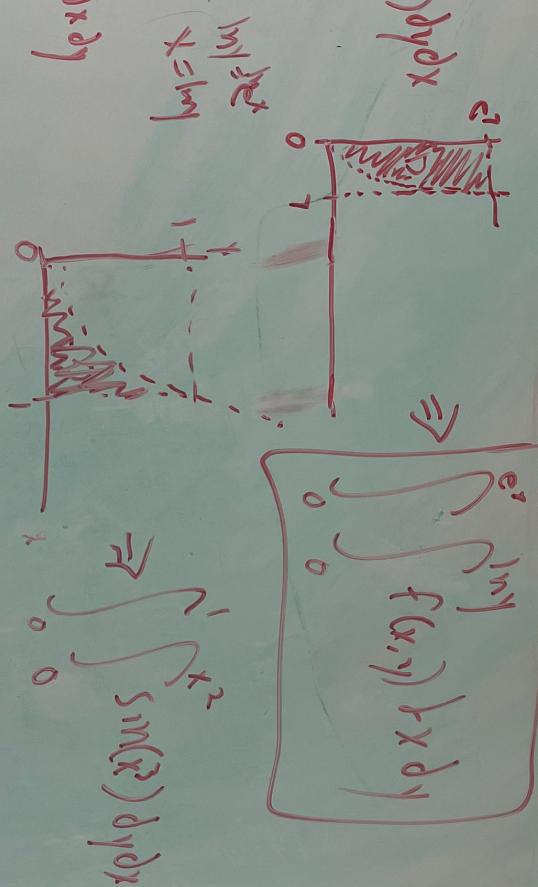
$$\begin{cases} \sqrt{2} \leq x \leq \sqrt{y} \\ 2 \leq y \leq 7 \end{cases}$$



$$\int_{\sqrt{2}}^{\sqrt{7}} \int_0^x f(x,y) dy dx$$

$$c. \int_0^7 \int_{e^y}^{e^x} f(x,y) dy dx$$

$$\begin{cases} e^y \leq y \leq e^x \\ 0 \leq x \leq 7 \end{cases}$$



$$\int_0^7 \int_0^{e^x} f(x,y) dx dy$$

$$\int_0^1 \int_0^{x^2} \sin(x^2) dy dx$$

$$d. \int_0^1 \int_y^1 \sin(x^2) dx dy$$

$$= \int_0^1 \sin(x^2) x^2 dx = \left[\frac{-\cos(x^2)}{3} \right]_0^1 = \boxed{\frac{\cos(1)}{3} - \frac{1}{3}}$$