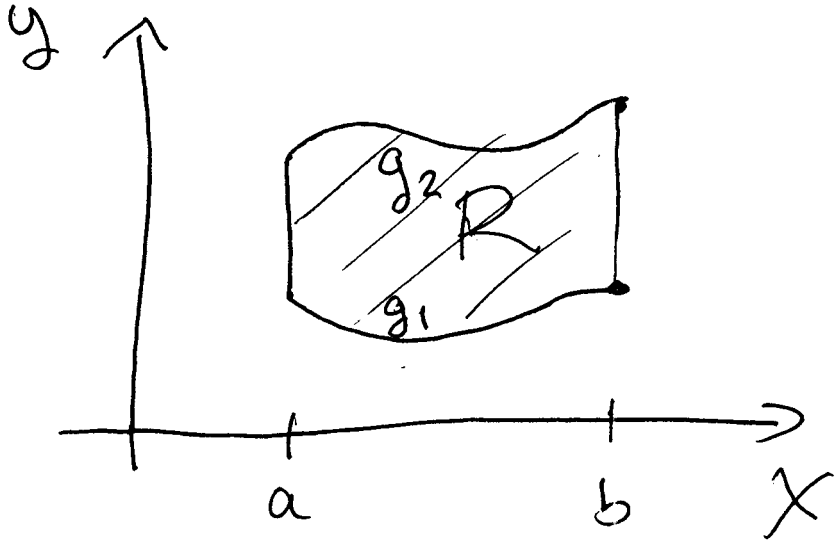
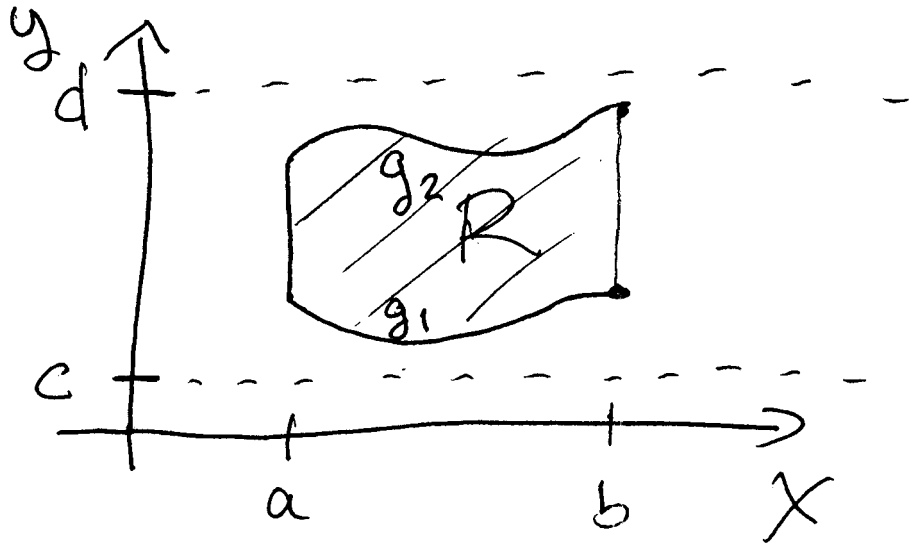
13.2



To integrate $f(x,y)$ over R

1) Place a larger rectangle $\tilde{R}$ around R.

2) Extend $f(x,y)$ to $\tilde{R}$ by defining $f(x,y) = 0$ for (x,y) in $\tilde{R}$ but outside R.



$$\iint_R f(x,y)\,dA \overset{\text{def}}{=} \iint_{\tilde{R}} f(x,y)\,dA$$

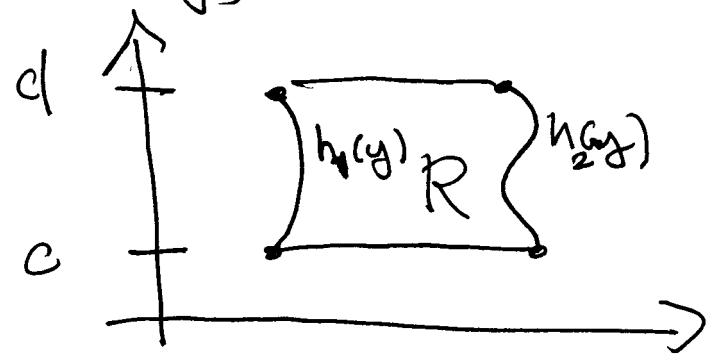
$$= \int_a^b \int_c^d f(x,y)\,dy\,dx$$

since $f(x,y) = 0$ outside R

$$= \int_a^b \left(\int \quad f(x,y)\,dy \right) dx$$

↑ to be completed!

Similarly,



$$\iint_R f(x,y)\,dA = \int_c^d \left(\int \; f(x,y)\,dx \right) dy$$

↑ to be completed!

(4)

13.2

Ex: Sketch the region of integration and evaluate the integral $\int_1^2 \int_y^{y^2} dx\,dy$ (4)

ex: Sketch the region of integration, then write an equivalent integral with the order reversed

$$\int_0^{3/2} \int_0^{9-4x^2} 16x \, dy \, dx$$

13.2

Ex: Sketch the region of integration and then evaluate the integral

$$\int_0^{2\sqrt{\ln 3}} \int_{y/2}^{\sqrt{\ln 3}} e^{x^2}\, dx\, dy$$