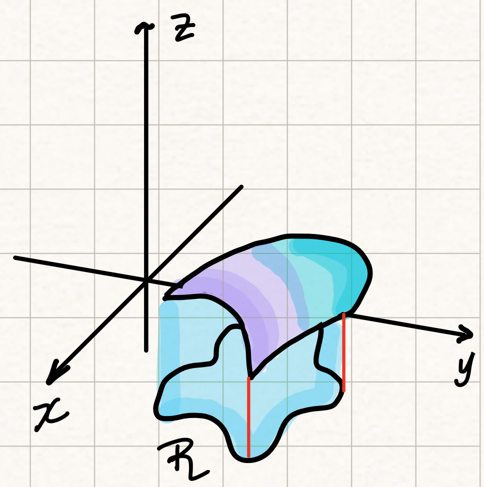
1.27.23

LECTURE 3

How do we find the volume of such solids:

- we can employ a similar riemann sum approach to find the volume



DEFINITION If f is a function of two variables and was continuous and non-negative over R then the volume of the solid between f and region R is:

$$\iint_R f(x,y)\,dA$$

THEOREM also if f is continuous over R (whose boundary is not too complicated) then the double integral exists

Corollary: if the boundary of R is a smooth curve or a finite collection of such curves, then the double integral exists

THEOREM Let f and g be functions defined on R and let c be a constant, and if both double integrals exist

1) $\iint_R c f(x,y)\,dA = c \iint_R f(x,y)\,dA$

2) $\iint_R (f(x,y) \pm g(x,y))\,dA = \iint_R f(x,y)\,dA \pm \iint_R g(x,y)\,dA$

3) if R is composed of R_1 and R_2, then $\iint_R = \iint_{R_1} + \iint_{R_2}$

LECTURE 4

THEOREM You can integrate the following : $\int_c^d \int_a^b f(x,y)\,dx\,dy$

by using iterated integrals $\int_c^d \left[\int_a^b f(x,y)\,dx \right] dy$

corollary: this is the same as $\int_a^b \left[\int_c^d f(x,y)\,dy \right] dx$

we can write this more simply as $\boxed{\int_a^b \int_c^d f(x,y)\,dy\,dx}$

the double integral can give us the volume under a surface