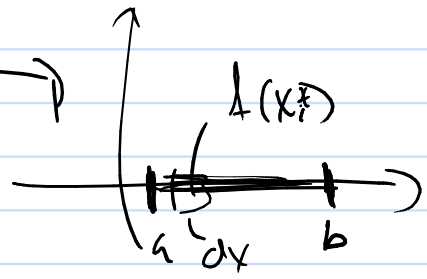
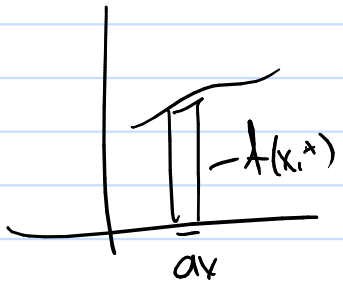
Math 344

$\int_a^b f(x)\,dx$

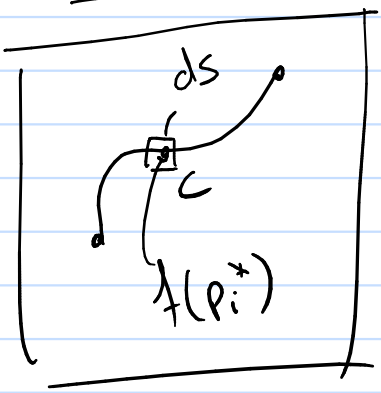




$ds = |r'|\,dt$

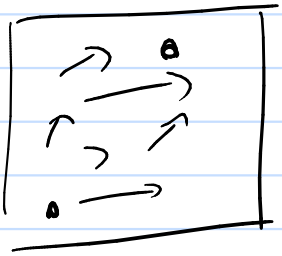
$\int_C f\,ds$

Applications $\int_C F \cdot dr$

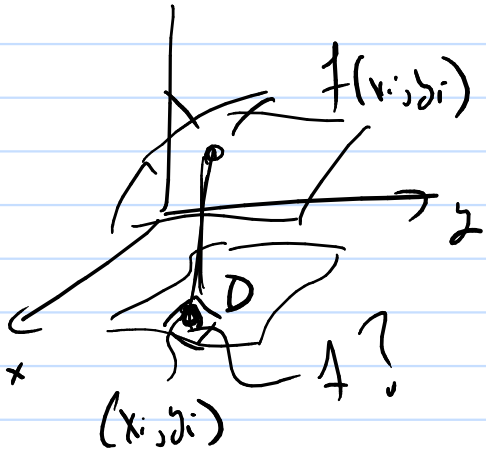


$r(t) = \langle x(t), y(t), z(t) \rangle$

$a \le t \le b$

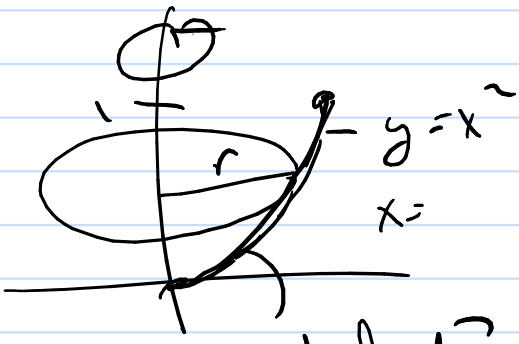


What about . . .



$\iint_D f\,dA$

then $= \pi r^2$

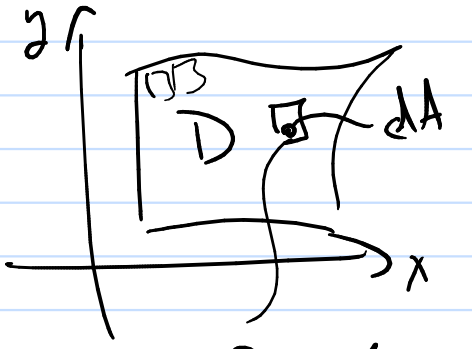


$$\int_0^1 2\pi r \, dy$$

Find length?

$$\int_0^1 2\pi \sqrt{y} \, dy$$

Find surface area?



$$\iint_D 1 \, dA$$

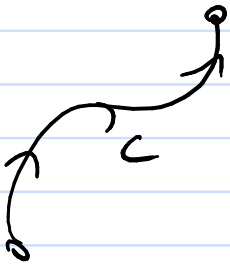
what happens

$P_i = (x_i, y_i)$

$f(x_i, y_i)$

D

Parametric Curves

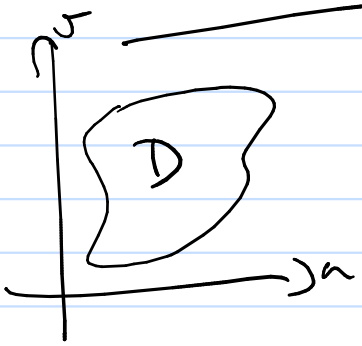


$C \subset D$

$r(t) = \langle x(t), y(t), z(t) \rangle$

$a \le t \le b$

Parametric Surfaces



$r(u,v) = \langle x(u,v), y(u,v), z(u,v) \rangle$

u is const u, v are in
v varies a flat 2D
domain

given $r \rightarrow$ plot parametric surface (use tech.)

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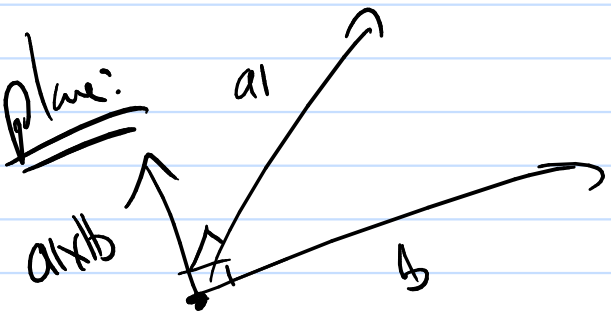
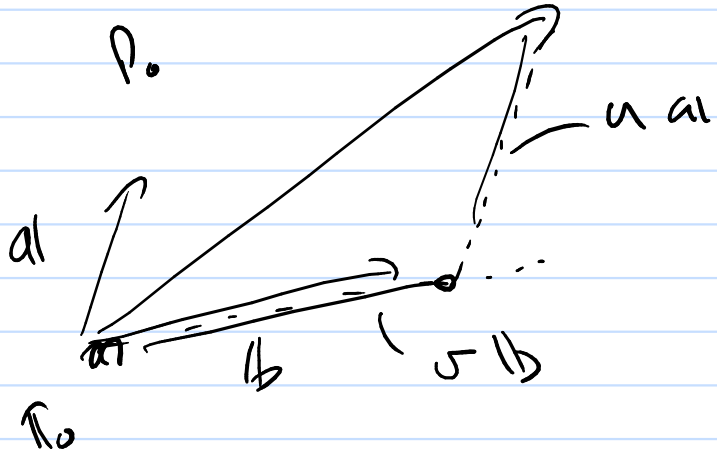
surface? $\rightarrow$ find r?

plane:



plane needs P_0 a point

and a normal $a_1 \times b$



any $r = r_0 + u a_1 + v b$

(ex) $a_1 = \langle 1,1,1 \rangle$ $\quad b = \langle 0,1,0 \rangle$

through $\langle 0,0,0 \rangle = r_0$

$r = \langle 0,0,0 \rangle + u\langle 1,1,1 \rangle + v\langle 0,1,0 \rangle$

$r = \langle u, u+v, u \rangle$

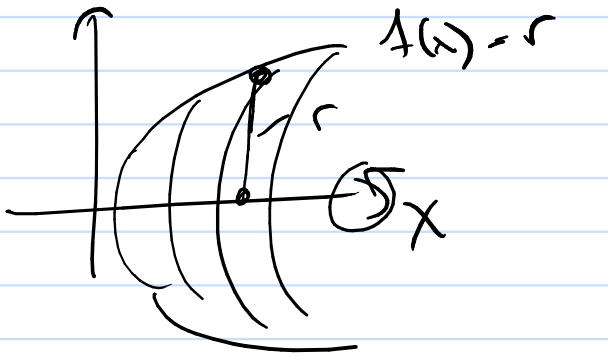
any surface $z = f(x,y)$

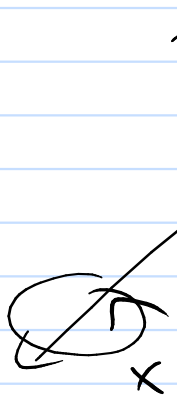
use $x = u$

$y = v$

$z = f(u,v)$

Surface of revolution

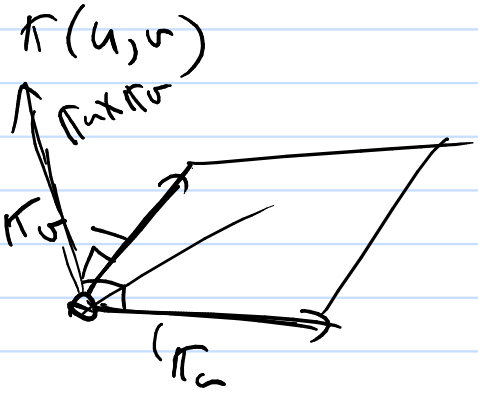




$x = u$

$y = f(u)\cos v$

$z = f(u)\sin v$

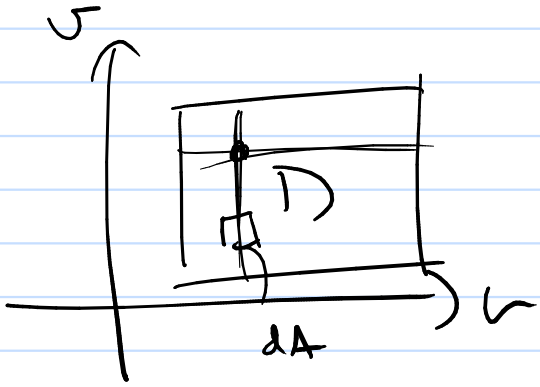


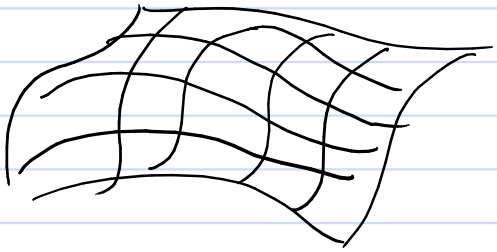
Note: if $r_v \times r_u \neq 0$ call S smooth (no corners)

Find Area of our parametric Surface

$$r(u,v) = \langle x(u,v),\ y(u,v),\ z(u,v) \rangle$$

u, v are from D.





$$\iint_D |r_u \times r_v| \, dA$$

$|r_u \times r_v|$ = area of tangent plane