Math 250B Test

Tues Oct 1

Do Sugg. HW for Sections 11.7 and 12.2

11.7 / 12.1 / 12.2 Cont'd

Graphing Cones

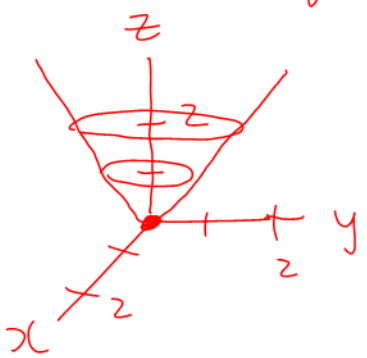
Ex: Graph $z = \sqrt{x^2+y^2}$ using Contour curves.

$z=0$: $0=\sqrt{x^2+y^2}$ $\quad 0=x^2+y^2$ circle of radius 0

$z=1$: $1=\sqrt{x^2+y^2}$ " 1

$z=2$: $2=\sqrt{x^2+y^2}$ $\quad 4=x^2+y^2$ " 2

$z=-1$: $-1=\sqrt{x^2+y^2}$ no solution



Cone

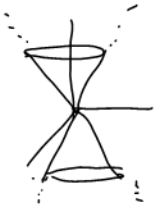
Ex: Transformations of $z = \sqrt{x^2+y^2}$

$z = -\sqrt{x^2+y^2}$

$z^2 = x^2+y^2$

$z = \pm\sqrt{x^2+y^2}$

Cone with 2 nappes

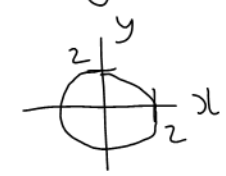


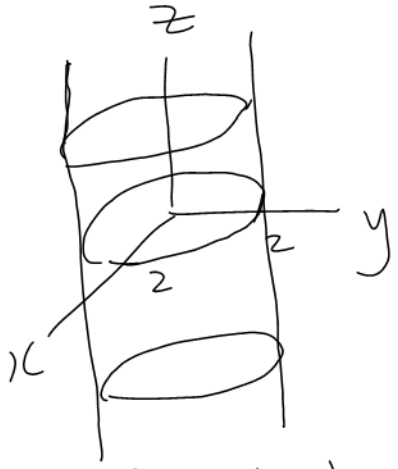
Graphing Cylinders

Ex: Graph $x^2+y^2=4$

In 2D

$x^2+y^2=4$





(circular) cylinder

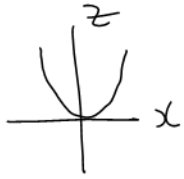
FACT

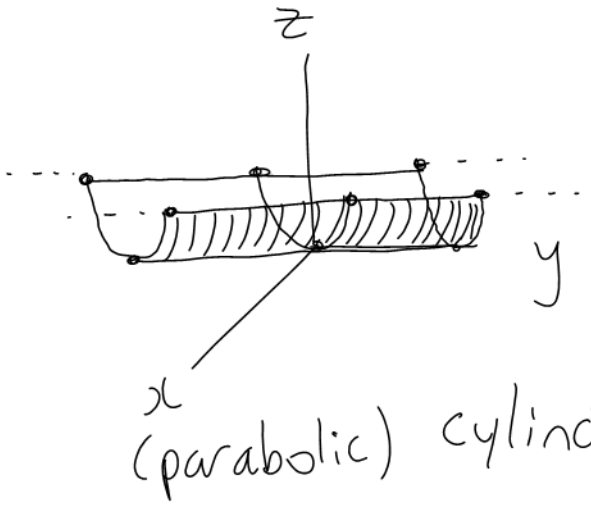
If the equation is missing a variable then every cross-section perpendicular to that axis is identical, and the surface is a cylinder.

Ex: Graph $z=x^2$

In 2D

$z=x^2$

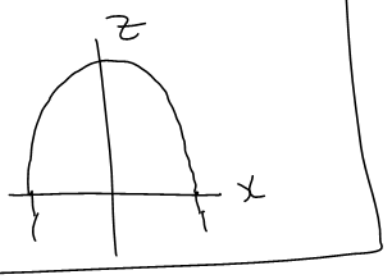


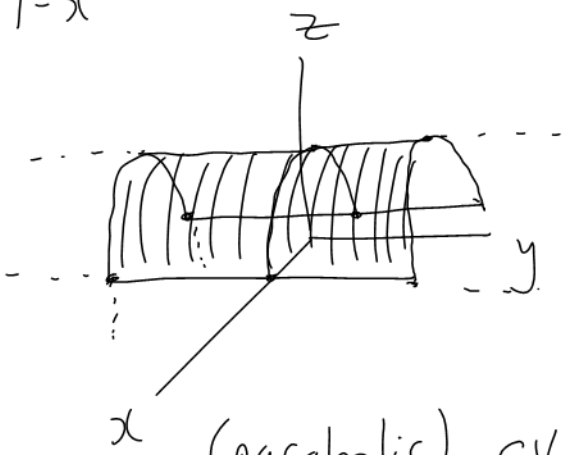


(parabolic) cylinder

Ex: Graph $z = 9 - x^2$

In 2D
$z = 9 - x^2$





(parabolic) cylinder

Graphing Planes

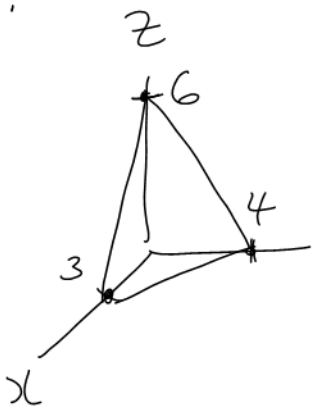
Ex: Graph $4x + 3y + 2z = 12$

Find the intercepts.

$x = y = 0$: $2z = 12$ $z = 6$

$x = z = 0$: $y = 4$

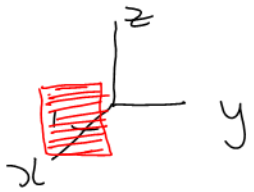
$y = z = 0$: $x = 3$



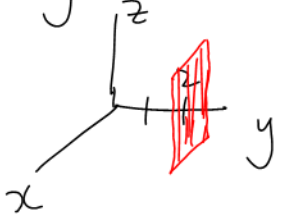
plane

A plane is an infinite surface.

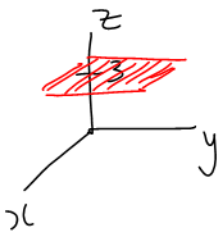
Ex: $x = 1$



$y = 2$



$z = 3$



Ex: Identify the type of surface.

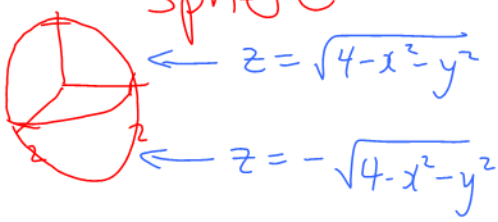
a) $z = 4 - x^2 - y^2$ $\quad z = 4 - (x^2 + y^2)$ paraboloid

b) $z = 4 - \sqrt{x^2 + y^2}$ Cone

c) $z = 4 - x^2$ cylinder

d) $z = 4 - x - y$ plane

e) $z^2 = 4 - x^2 - y^2$ $\quad x^2 + y^2 + z^2 = 4$ Sphere



f) $z = \sqrt{4 - x^2 - y^2}$ hemisphere

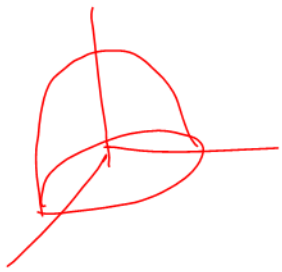
TRICKY

Contour Curves

$z = -1$: No solution

$z = 0$ ....

$z = 2$ ...



$f(x)$	$f'(x)$
e^{2x}	$2e^{2x}$
$\ln x$	$\frac{1}{x}$
$\sin 2x$	$2\cos 2x$
$\cos 3x$	$-3\sin 3x$
$\frac{2}{x^7} = 2x^{-7}$	$-14x^{-8}$
$\sqrt[3]{x} = x^{1/3}$	$\frac{1}{3}x^{-2/3}$

$f(x)$	$\int f(x)dx$
e^{2x}	$\frac{e^{2x}}{2} + C$
$\frac{1}{x}$	$\ln\lvert x\rvert + C$
$\sin 2x$	$-\frac{\cos 2x}{2} + C$
$\cos 2x$	$\frac{\sin 2x}{2} + C$
$\frac{2}{x^7} = 2x^{-7}$	$-\frac{1}{3}x^{-6} + C$
$\sqrt[3]{x} = x^{1/3}$	$\frac{3}{4}x^{4/3} + C$