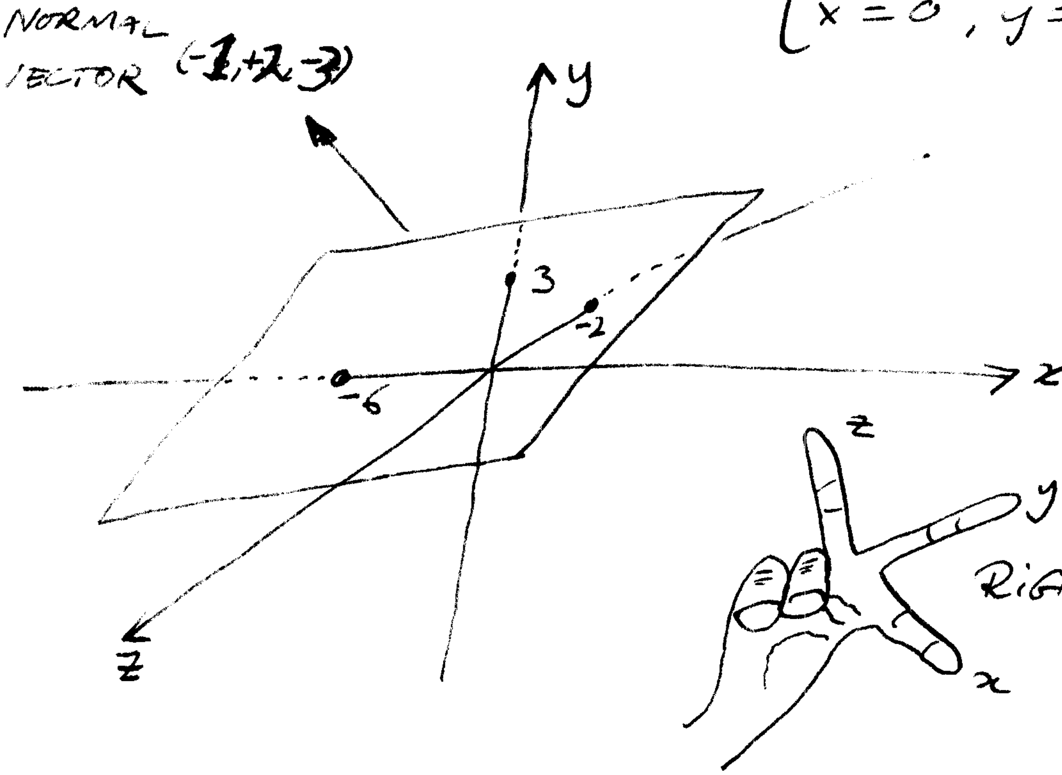
Q1 ϕ 14.1.10

$$-x+2y-3z=6 \Rightarrow \begin{cases} y=0,\ z=0,\ x=-6 \\ z=0,\ x=0,\ y=3 \\ x=0,\ y=0,\ z=-2 \end{cases}$$



RIGHT HAND
RULE

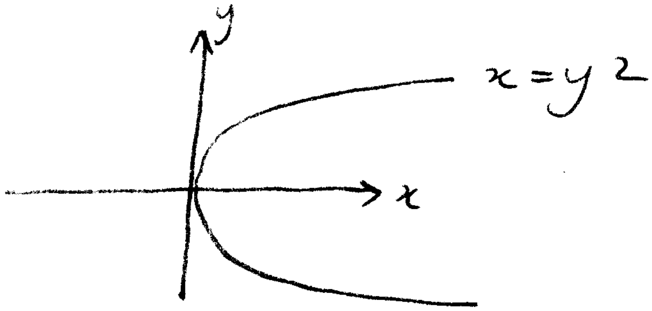
ϕ 14.1.16

$$\underbrace{(x-1)^2+(y-2)^2+(z+1)^2}_{} = 9$$

minimized
by $x=1,\ y=2,\ z=-1$
$\Rightarrow$ centre $(1,2,-1)$

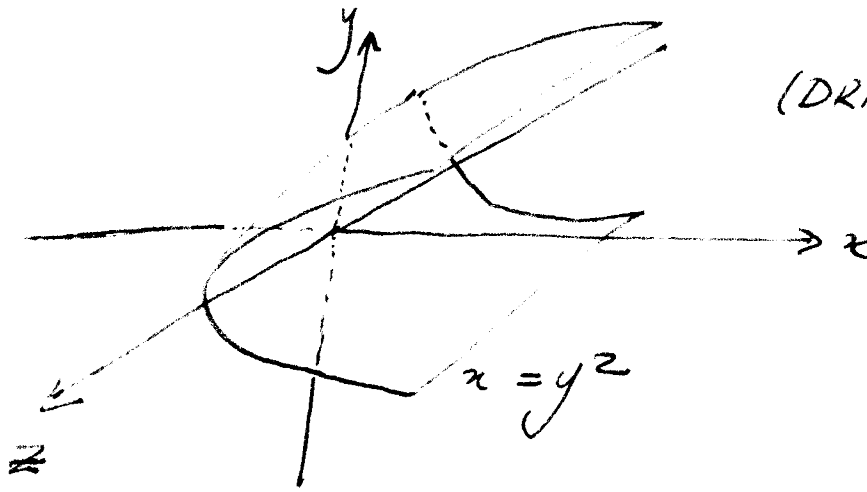
Radius
squared
$\Rightarrow R=3$

§ 14.1.24



CROSS SECTION

$\Rightarrow$



(DRAW SURFACE FIRST!)

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§ 14.1.35

a) see book

b) $dV = \underbrace{2\pi r}_{\text{perimeter}}\, dr\, dz$

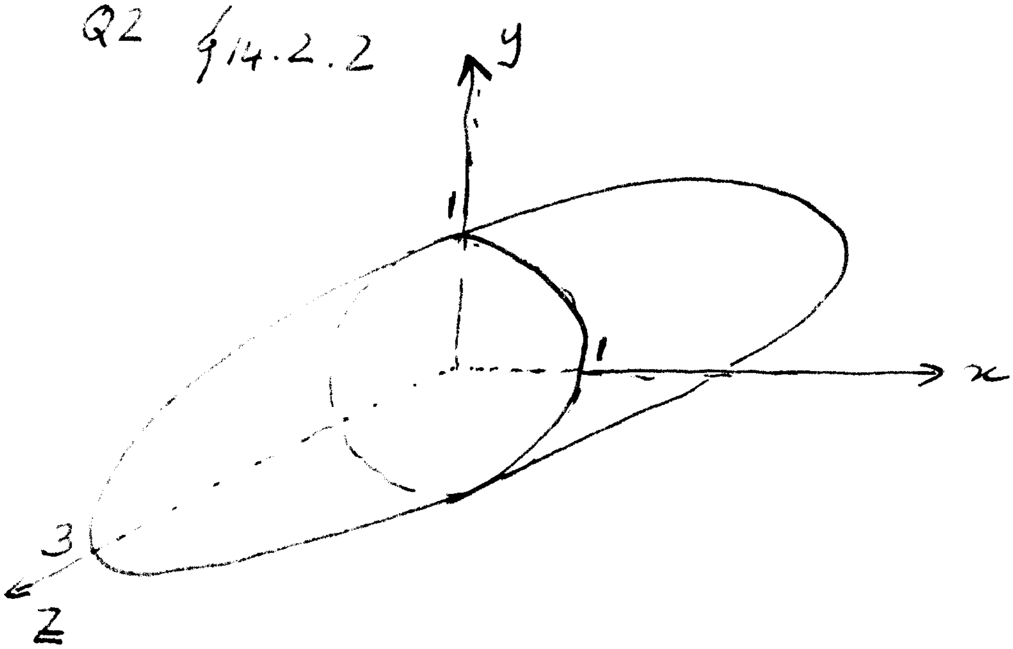
but $0 \le z \le e^{-r^2}$

$\Rightarrow dV = 2\pi r\, dr\, e^{-r^2}$

c) $V = \int_0^\infty 2\pi r\, dr\, e^{-r^2}$

d) $V = \int_0^\infty \pi\, d(r^2)\, e^{-r^2} = \pi$

Q2 §14.2.2

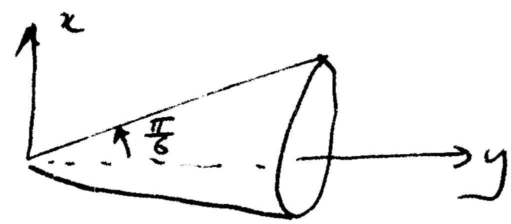


§14.2.12

$z^2 = \frac{x^2}{a^2} + \frac{y^2}{a^2}$ describes a cone about z-axis.

(because, e.g., if $y = 0$, $z = \pm \frac{x}{a}$ is a line)

want $z = \tan\frac{\pi}{6} y$



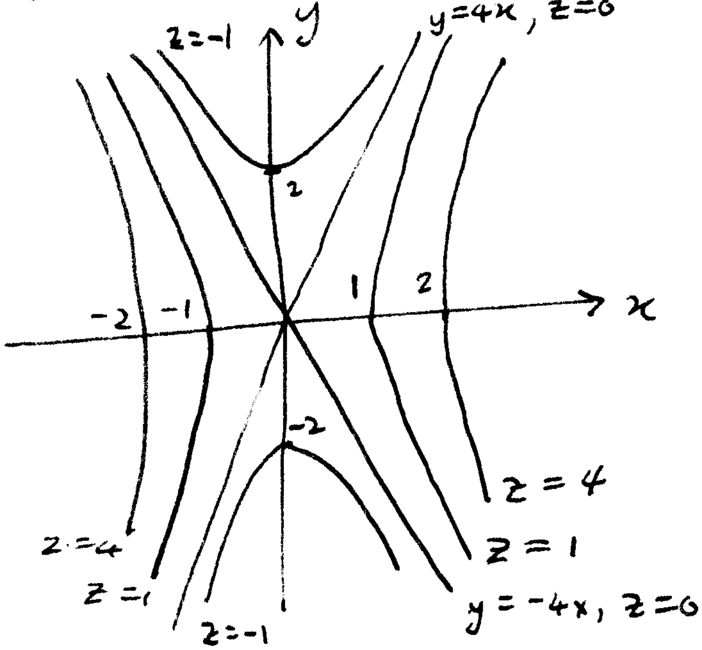
$= \frac{\sqrt{3}}{3} y$

$\Rightarrow y^2 = \frac{1}{\sqrt{3}}(x^2 + y^2)$

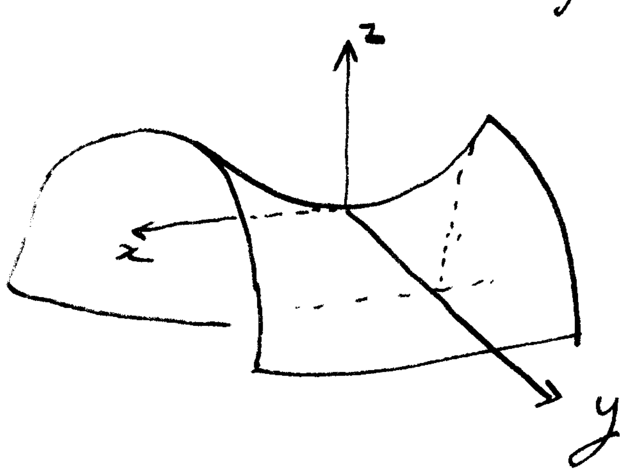
§14.2.24

$$z = x^2 - y^2/4$$

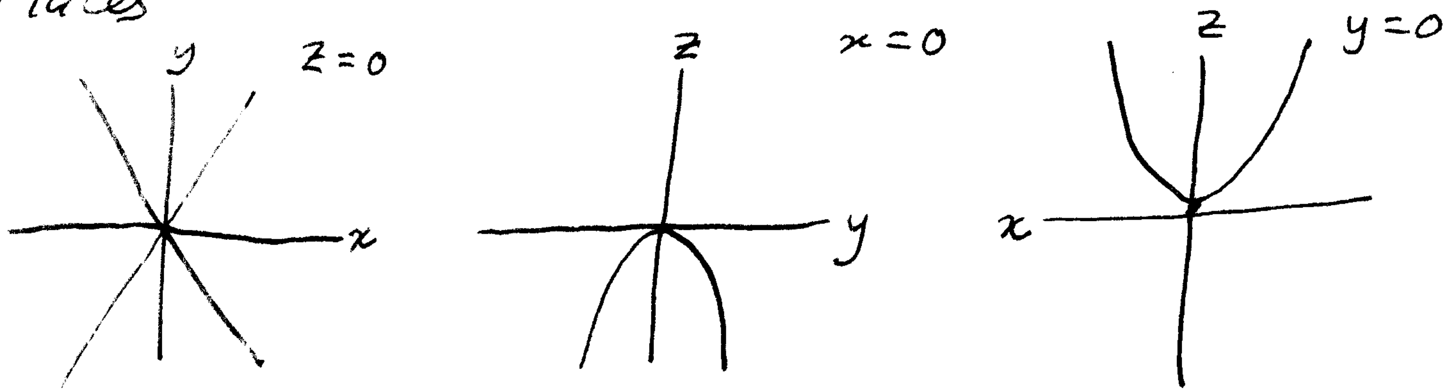
Lines of constant z are hyperbolae



Surface is a saddle / hyperbolic paraboloid



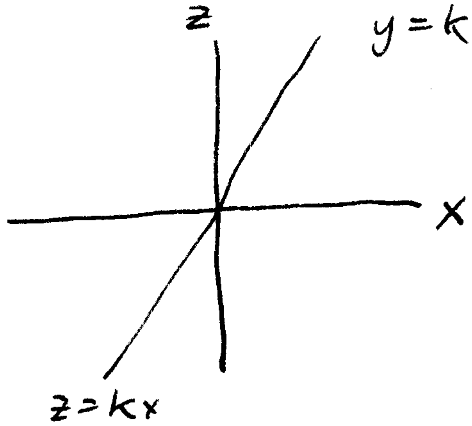
Traces



§14.2.38 $\quad z = xy$

a) when $y = k$ $\quad z = kx$

ie.

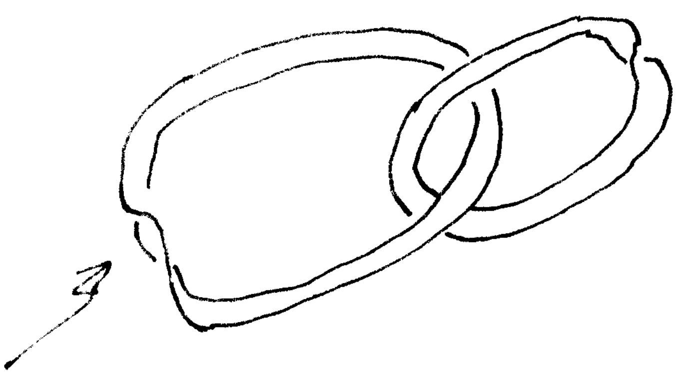


a line

b) good luck!

Q3 see lecture notes

Q4 Did you get



how many twists ??