

Mat 16C
Vogler

Sketching Using Traces & Level Curves

Ex Sketch $z = 3 + x^2 + y^2$ using traces & level curves
w/ $z = 3, 4, 5$

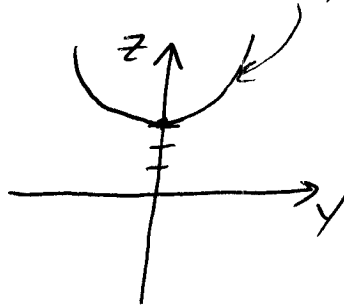
xy-trace

$$z=0 \Rightarrow x^2 + y^2 = -3$$

DNE

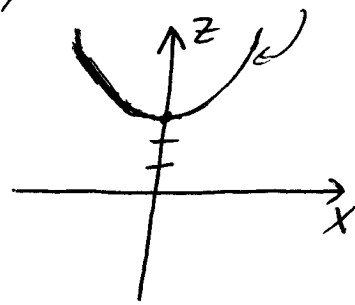
yz-trace

$$x=0 \Rightarrow z = 3 + y^2$$



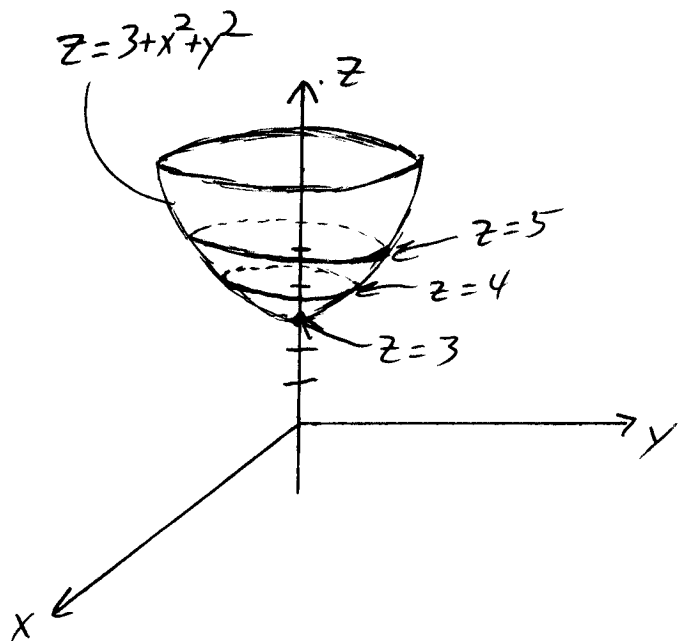
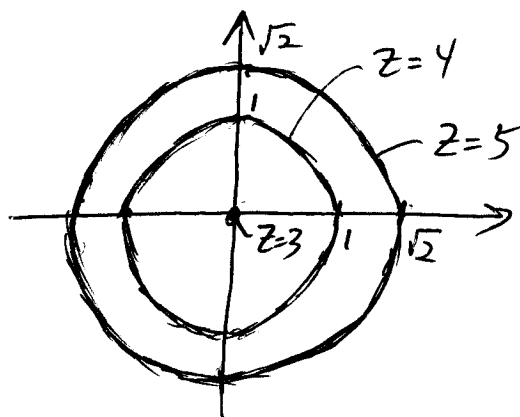
xz-trace

$$y=0 \Rightarrow z = 3 + x^2$$



Level Curves

<u>z</u>	<u>Curve</u>
3	$x^2 + y^2 = 0$ Pt (0,0)
4	$x^2 + y^2 = 1$ Circle
5	$x^2 + y^2 = 2$ Circle

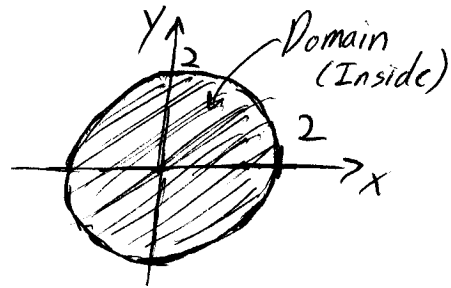


Domain & Range

Ex Find domain & range of $z = \ln(4 - x^2 - y^2)$

$$\Rightarrow 4 - x^2 - y^2 > 0 \Rightarrow x^2 + y^2 < 2^2 \text{ Circle}$$

Domain: Set of all points (x, y) inside circle $x^2 + y^2 = 2^2$



When $x=0$ & $y=0 \Rightarrow z$ has largest value of $z = \ln 4$

Also, As (x, y) gets near edge of circle $4 - (x^2 + y^2) \xrightarrow{\text{goes to}} 0$

$$\Rightarrow z = \ln(4 - (x^2 + y^2)) \xrightarrow{\text{goes to}} -\infty$$

Hence, Range: $-\infty < z \leq \ln 4$

Extra info

Sketch (Using level curves & traces)

