

Exam 1 10/13 in class

No calculators.

MIC
T/F

~10
or
so.

Word

~3 questions.

Wednesday 10/6 last material for exam.

No class Monday 10/11

Tuesday 10/12 is a Monday schedule.

14.1 Functions of Several Variables

$$(10) F(x,y) = 1 + \sqrt{4-y^2}$$

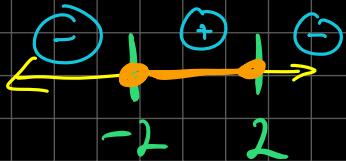
$$(a) F(3,1) = 1 + \sqrt{4-(1)^2} = 1 + \sqrt{3}$$

(b) domain of F .

$$x \in \mathbb{R}$$

$$y - \text{need } 4-y^2 \geq 0$$

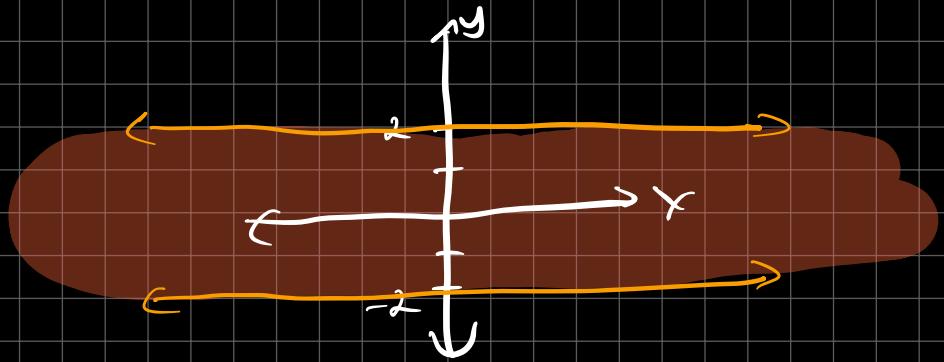
$$(2+y)(2-y) \geq 0$$



$$\boxed{-2 \leq y \leq 2}$$

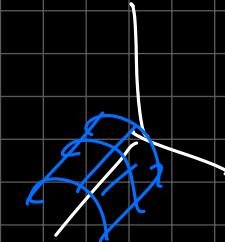
$$\text{Domain of } F(x,y) = \{(x,y) \mid x \in \mathbb{R}, -2 \leq y \leq 2\}.$$

Sketch graph of Domain.



(C) Range of $F = 1 + \sqrt{4-y^2}$
z-value.

$$1 \leq z \leq 3$$



Why this Shape?

$$z = 1 + \sqrt{4-y^2}$$

$$z-1 = \sqrt{4-y^2}$$

$$(z-1)^2 = 4-y^2$$

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

circle of radius = 2

centered at $(0, 1)$

in yz plane
for all $x \in \mathbb{R}$.

(II) $f(x, y, z) = \sqrt{x} + \sqrt{y} + \sqrt{z} + \ln(4-x^2-y^2-z^2)$

What is the domain of f ?

biggest
when $x=y=z=0$
 $\rightarrow \ln(4)$

$$\sqrt{x} \Rightarrow x \geq 0$$

$$\sqrt{y} \Rightarrow y \geq 0$$

$$\sqrt{z} \Rightarrow z \geq 0$$

Range

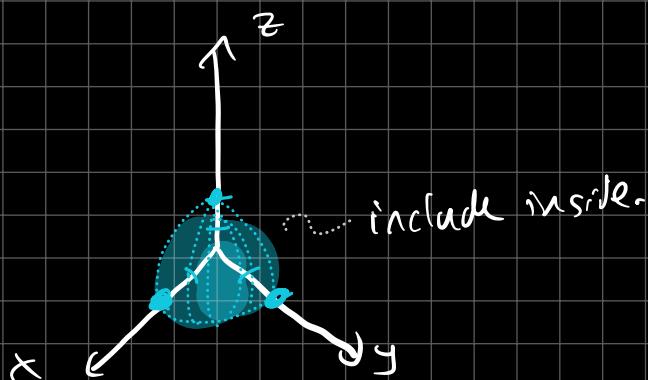
$$-\infty < f(x,y,z) \leq \ln 4$$

$$\ln(4-x^2-y^2-z^2) \Rightarrow 4-x^2-y^2-z^2 > 0 \Rightarrow x^2+y^2+z^2 < 4$$

Inside of sphere

open ball.

$$D = \{(x,y,z) \mid x, y, z \geq 0 \text{ and } x^2+y^2+z^2 < 4\}.$$

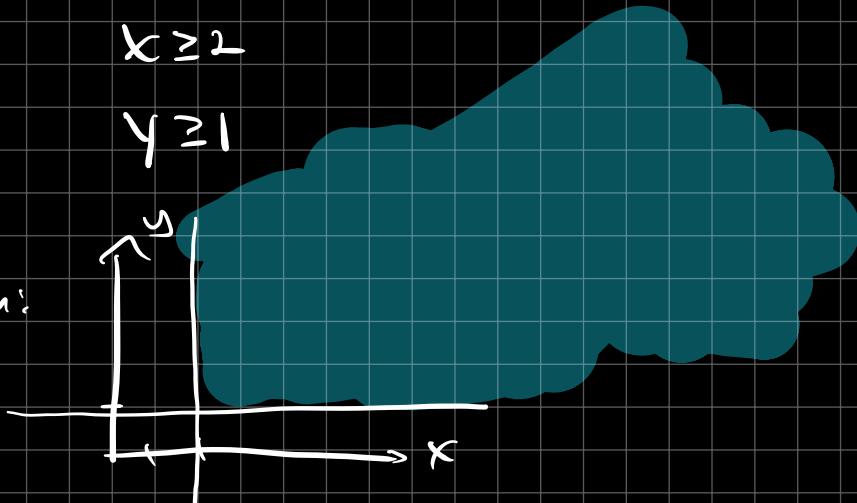


$$(13) \quad f(x,y) = \sqrt{x-2} + \sqrt{y-1}$$

find domain: $x \geq 2$

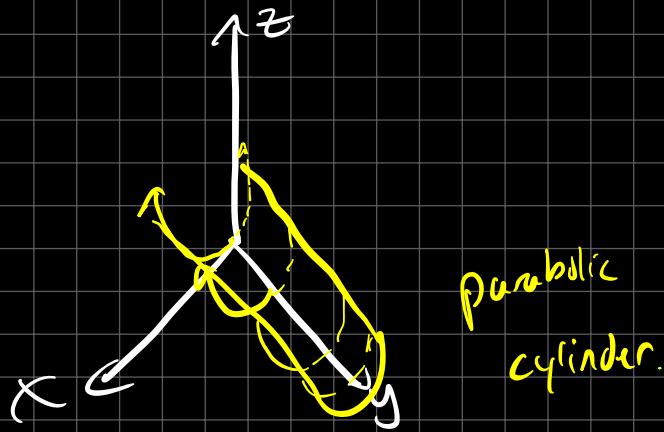
$$y \geq 1$$

Sketch domain:



$$(24) \quad f(x,y) = x^2 \quad \text{Sketch a graph.}$$

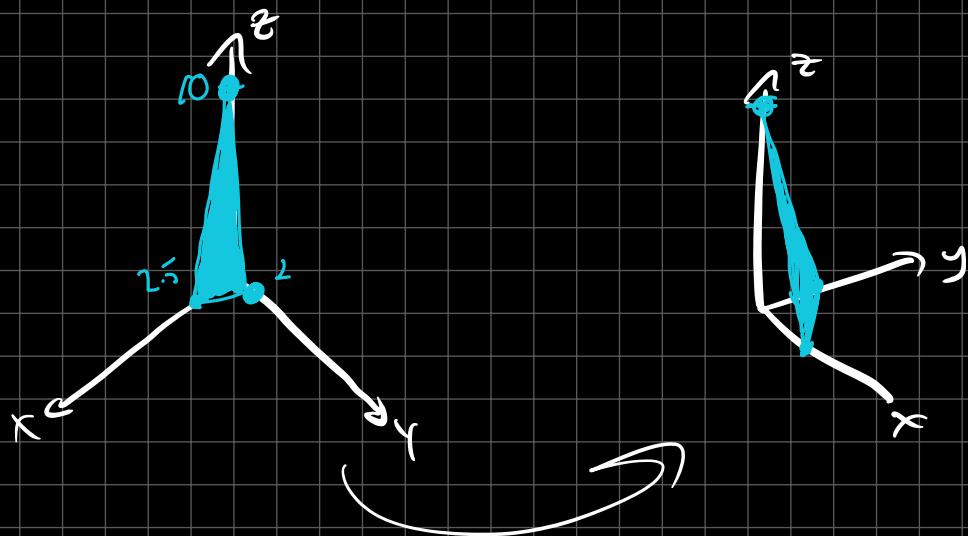
parabola in xz plane



parabolic
cylinder.

(24) $f(x,y) = 10 - 4x - 5y$

$$z = 10 - 4x - 5y \rightarrow 4x + 5y + z = 10$$

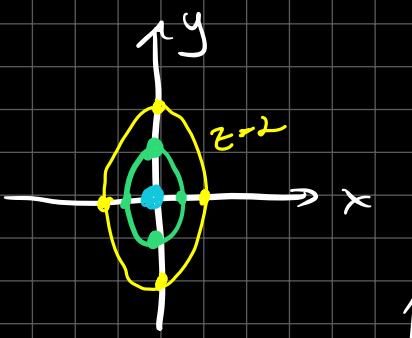


(25) $f(x,y) = \sqrt{4x^2 + y^2}$

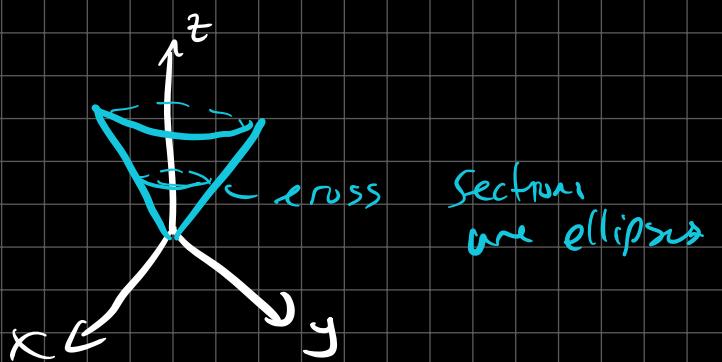
$$\frac{z}{0} \quad \frac{z = \sqrt{4x^2 + y^2}}{0 = \sqrt{4x^2 + y^2}} \rightarrow x = y = 0 \bullet z = 0$$

$$1 \quad 1 = \sqrt{4x^2 + y^2} \quad 4x^2 + y^2 = 1 \bullet z = 1$$

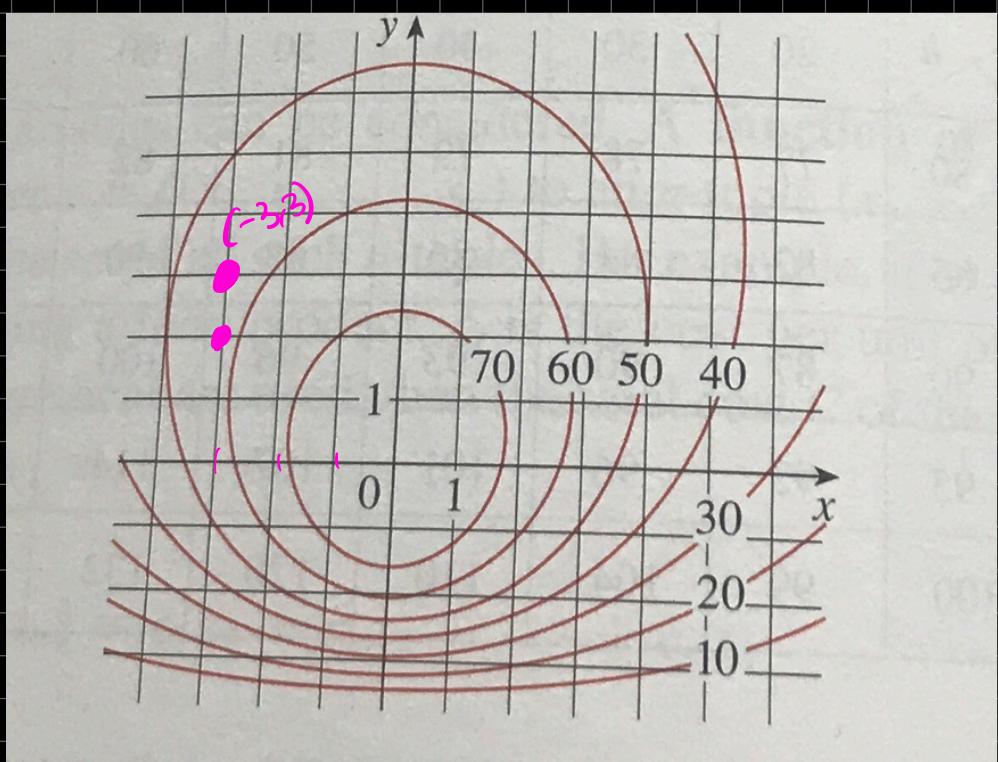
$$2 \quad 2 = \sqrt{4x^2 + y^2} \quad 4x^2 + y^2 = 4 \bullet z = 2$$



elliptical cone.



(33)



estimate $f(-3, 1) \approx 55$

$f(-3, 1) \approx 58$ or maybe 59

(47) $d(x, y) = \sqrt{x} + y$ draw contour map.

b

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

0

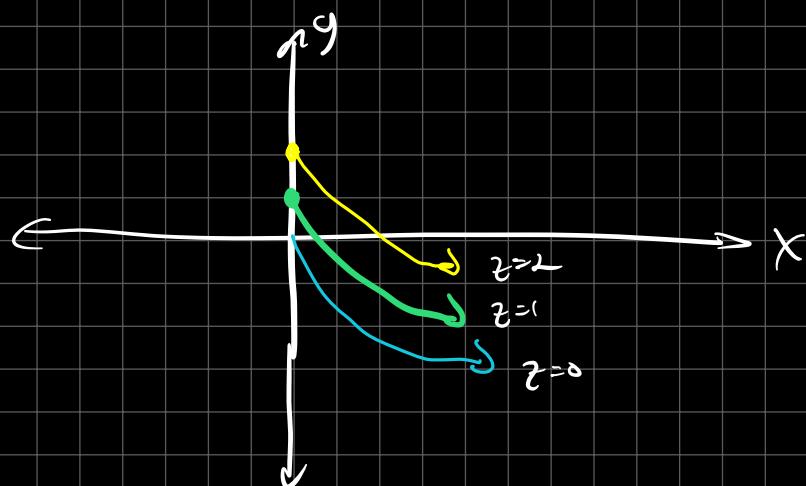
$$0 = \sqrt{x^2 + y^2} \Rightarrow y = -\sqrt{x^2}$$

1

$$1 = \sqrt{x^2 + y^2} \Rightarrow y = 1 - \sqrt{x^2}$$

2

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

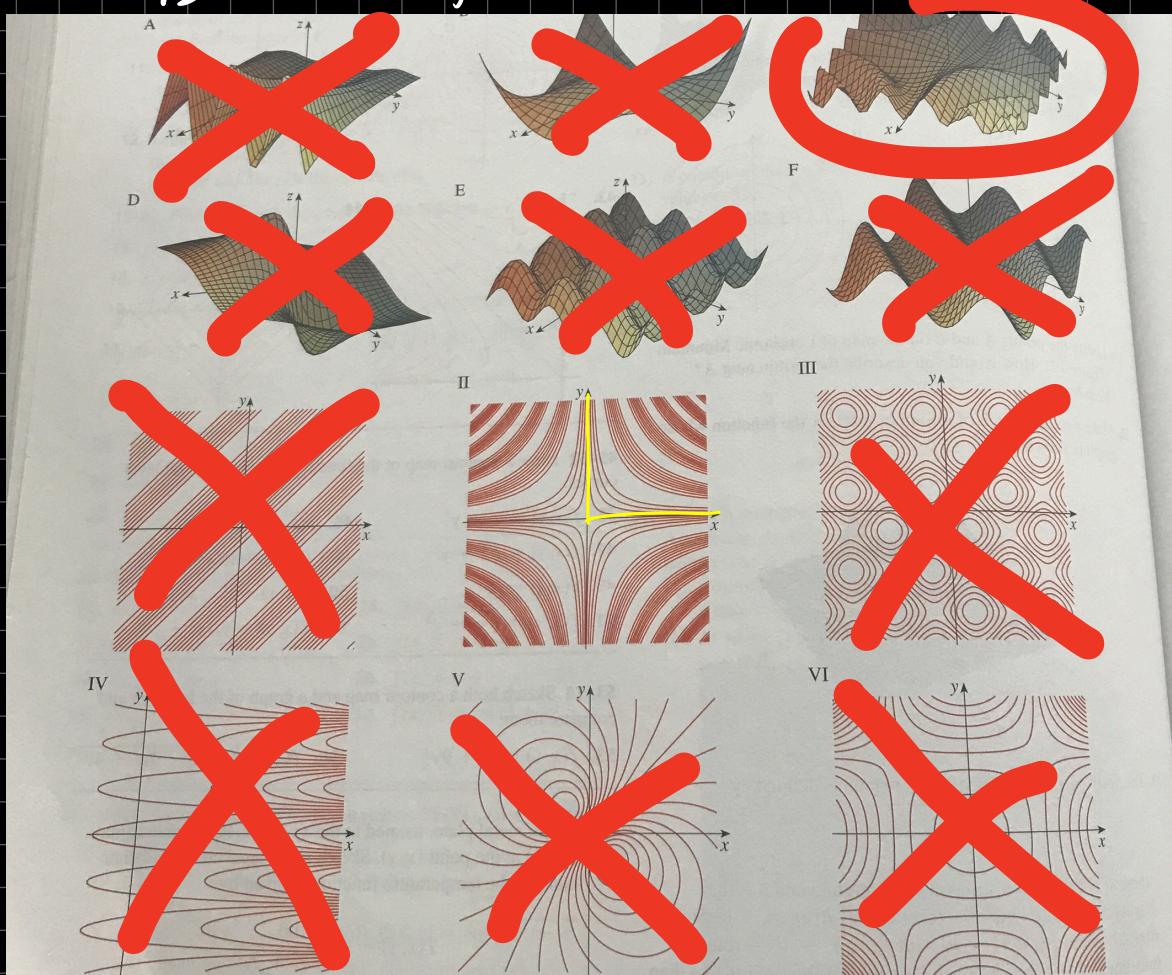


(61)

$z = \sin(xy)$ find graph and contour curves!

when
 $x \text{ or } y = 0$

$$z = \sin(0) = 0$$



(66)

$$z = \frac{x-y}{1+x^2+y^2}$$

