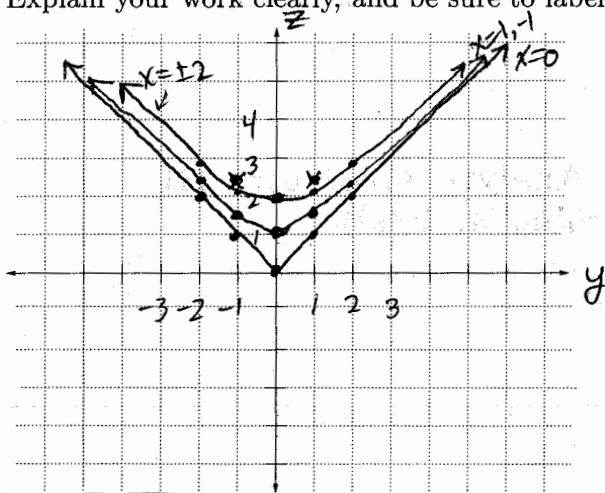


1. Use (at least two different sets of) traces to sketch the graph of the function  $f(x, y) = \sqrt{4x^2 + y^2}$ . Explain your work clearly, and be sure to label all axes, scales, etc on your graphs.



X-traces:

$x=0 \Rightarrow z = \sqrt{y^2} \rightarrow$

$y$	$z$
0	0
$\pm 1$	1
$\pm 2$	2

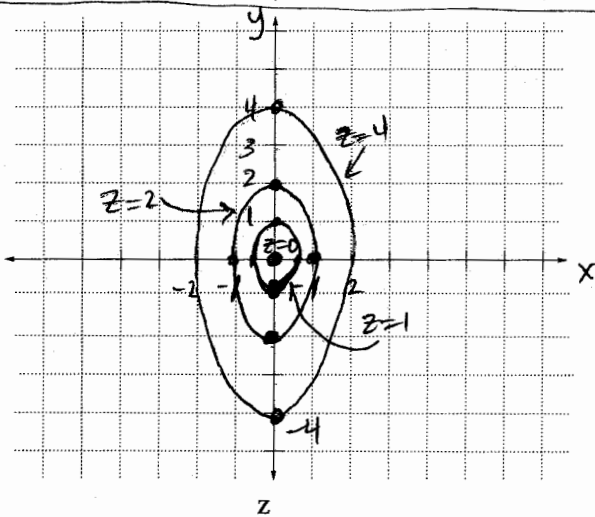
$x=1 \Rightarrow z = \sqrt{1+y^2} \rightarrow$

$y$	$z$
0	1
$\pm 1$	$\sqrt{2} \approx 1.4$
$\pm 2$	$\sqrt{5}$

(same for  $x=-1$ )

$x=2, -2 \Rightarrow z = \sqrt{4+y^2} \rightarrow$

$y$	$z$
0	2
$\pm 1$	$\sqrt{5}$
$\pm 2$	$\sqrt{8}$



Z-traces:

$z=0 \Rightarrow \sqrt{4x^2 + y^2} = 0 \Rightarrow 4x^2 + y^2 = 0 \Rightarrow (x, y) = (0, 0)$

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

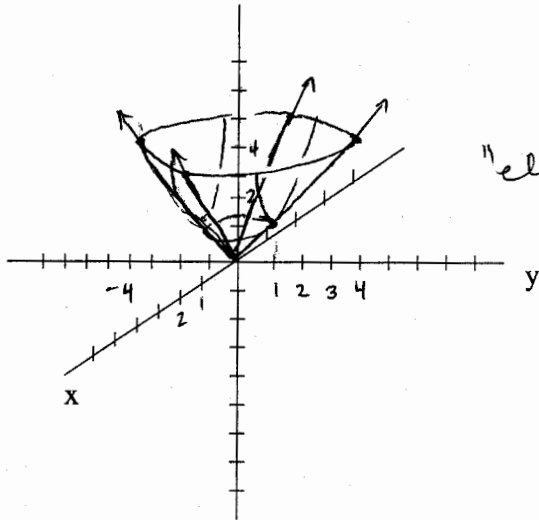
$x$	$y$
0	$\pm 1$
$\pm \frac{1}{2}$	0

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

$x$	$y$
0	$\pm 2$
$\pm 1$	0

$z=4 \Rightarrow \sqrt{4x^2 + y^2} = 4 \Rightarrow 4x^2 + y^2 = 16$

$x$	$y$
0	$\pm 4$
$\pm 2$	0



"elliptic cone"

{ cone which is wider in the y-direction than in the x-direction.

