Solutions:

① a) $x^2 + (y/4)^2 + z^2 = 1$: ellipsoid

$y=0$: $x^2 + z^2 = 1$: circle centered at $(0,0)$ w/ radius 1 on x-z plane

b) $(x/3)^2 + (y/5)^2 - 5z^2 = 1$: hyperboloid (one sheet)

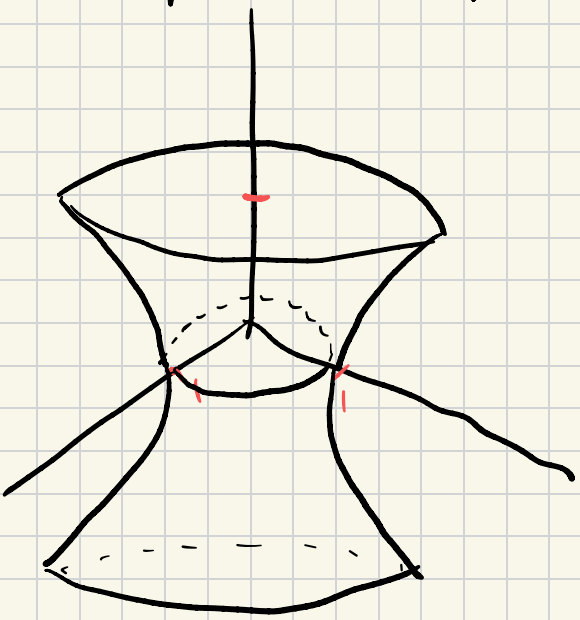
$y=1$: $(x/3)^2 + 1/25 - 5z^2 = 1$

$\Rightarrow$ $(x/3)^2 - 5z^2 = 24/25$ hyperbola

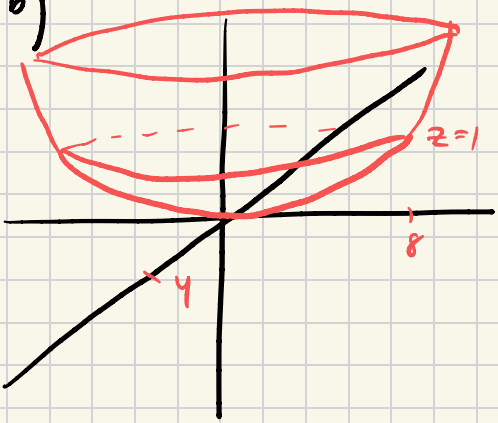
c) $y = 3x^2$: parabolic cylinder

$z=27$: parabola on plane $z=27$

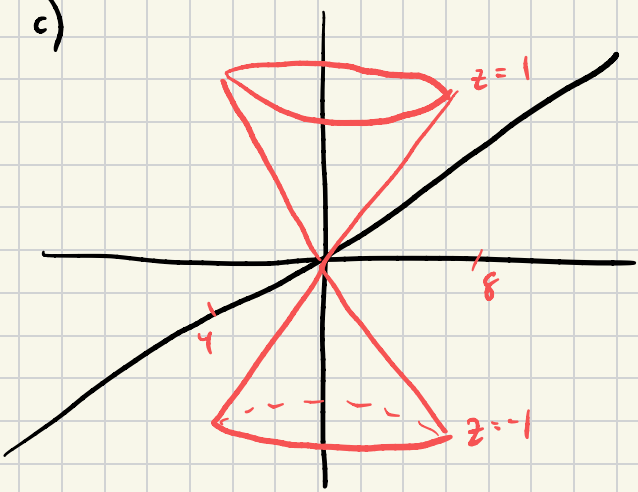
② a) $x^2 + y^2 - z^2 = 1$: hyperboloid (one sheet)



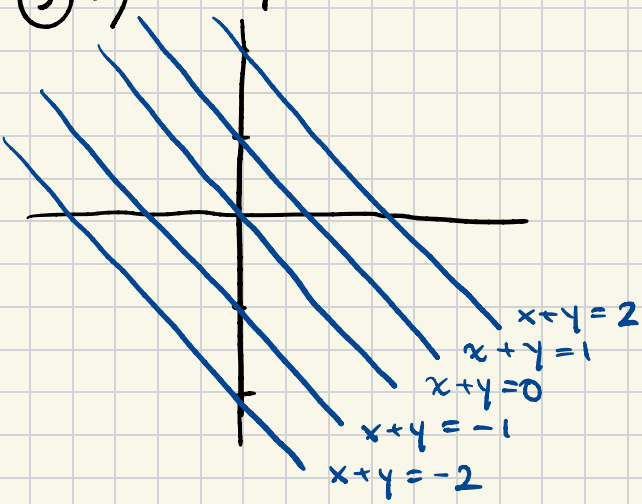
b)



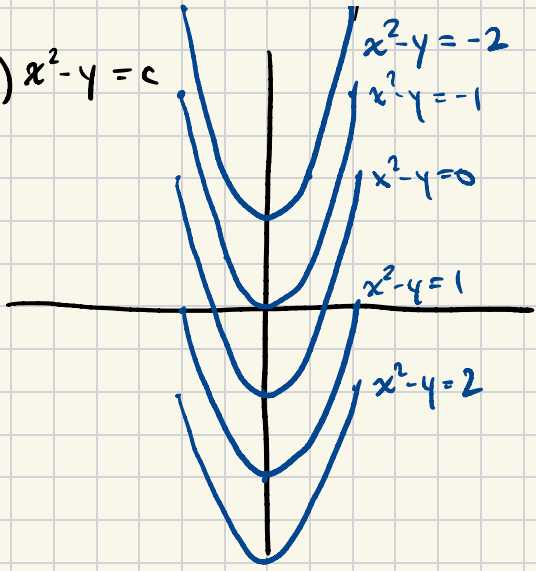
c)



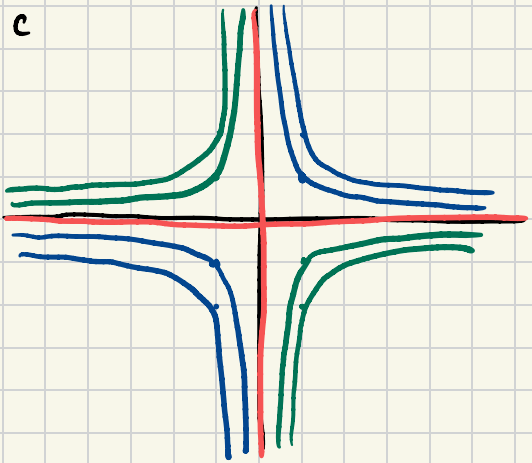
(3) a) $x+y=c$



b) $x^2-y=c$



c) $xy = c$



$xy = 2$
$xy = 1$
$xy = 0$

$xy = -1$
$xy = -2$

4

$f(x,y,z) = x^2+y^2-z^2$, $f(x,y,z) = -2,-1,0,1,2$

$x^2+y-z^2 = 0$: Elliptic cone

$x^2+y^2-z^2 = -1$: Two-sheeted Hyperbola

$x^2+y^2-z^2 = -2$: Two-sheeted Hyperbola

$x^2+y^2-z^2 = 1$: One-Sheeted Hyperbola

$x^2+y^2-z^2 = 2$: One-Sheeted Hyperbola