Math 243

Spring 2017

Asst. 11

Selected Solutions

§13.1

(2) (a) Domain: $f(x,y) = \sqrt{y-x}$. Need $y - x \geq 0$

so domain is $\boxed{x \leq y}$

(b) Range: Can just look at $x=0$, then as $y$ varies over all numbers $\geq 0$

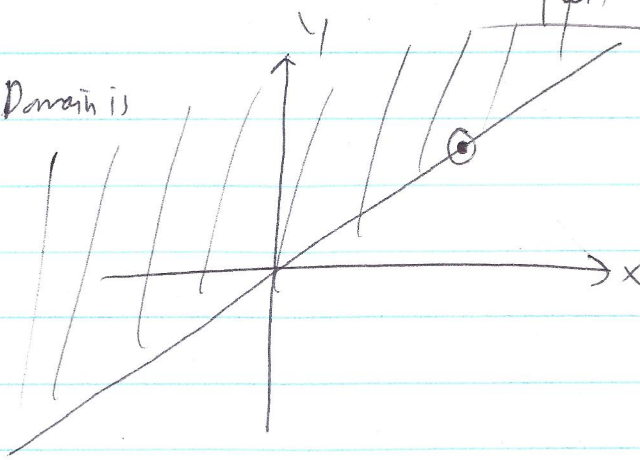
$\sqrt{y}$ varies over all numbers $\geq 0$

so range is $\boxed{[0,\infty)}$

(c) $c = \sqrt{y-x}$ Then $c^2 = y - x$ so $\boxed{y = x + c^2}$

so $\boxed{\text{level curves are all lines parallel to } y=x \text{ with } y\text{-intersept} \geq 0}$

(d) Domain is




boundary is $\boxed{y=x}$

(e) The boundary is in the domain so the domain is $\boxed{\text{closed}}$

& so the domain contains boundary points and hence is $\boxed{\text{not open}}$

(f) The domain contains points with $y$-coordinates as big as you want (like $(0,y)$)

so $\boxed{\text{the domain is unbounded}}$

(8)(a) $f(x,y) = \sqrt{9-x^2-y^2}$, need $9-x^2-y^2 \geq 0$

so domain is $\boxed{x^2+y^2 \leq 9}$ (a closed disc of radius 3)

(b) ~~at~~ $x^2+y^2 \geq 0$

so $9-x^2-y^2 \leq 9$

so $\sqrt{9-x^2-y^2} \leq 3$

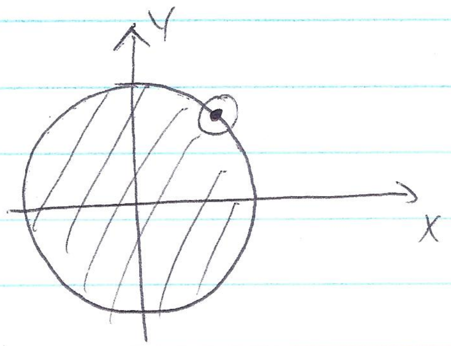
as x, y vary over the domain get range of $\boxed{[0,3]}$

(c) $c = \sqrt{9-x^2-y^2}$ then $c^2 = 9-x^2-y^2$

so $\boxed{x^2+y^2 = 9-c^2}$

so as $c$ varies in $[0,3)$ get circles of radius ~~r~~ $r$ with $0 < r \leq 3$ centered at the origin. For $c=3$, just get the origin itself

(d)



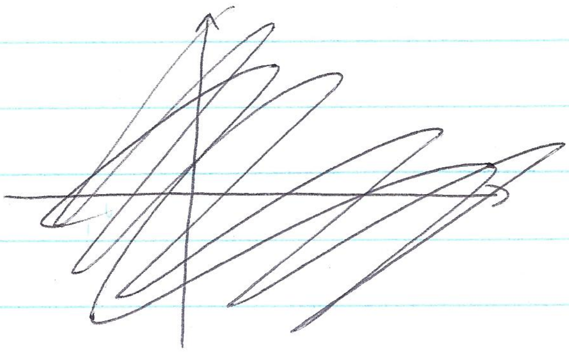

So boundary is $\boxed{x^2+y^2=9}$

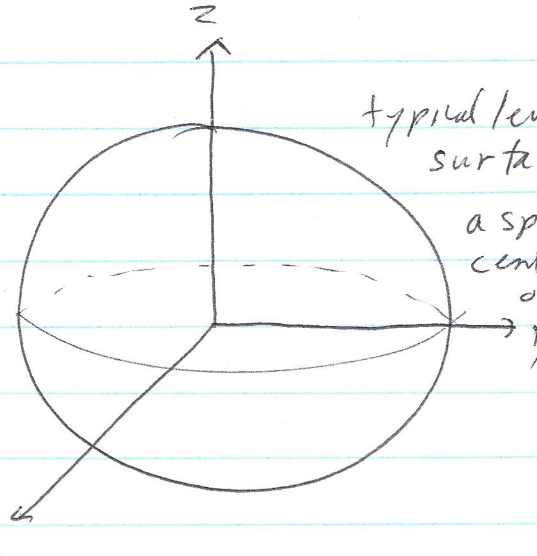
(e) The boundary is in the domain so the domain is $\boxed{\text{closed}}$
& hence, because it contains boundary points, the domain is $\boxed{\text{not open}}$

(f) The domain is contained in the ball $x^2+y^2 \leq 9$, so it is $\boxed{\text{bounded}}$

(14) (e)
(16) (c)

(34) $c = \ln(x^2+y^2+z^2)$, then $e^c = x^2+y^2+z^2$

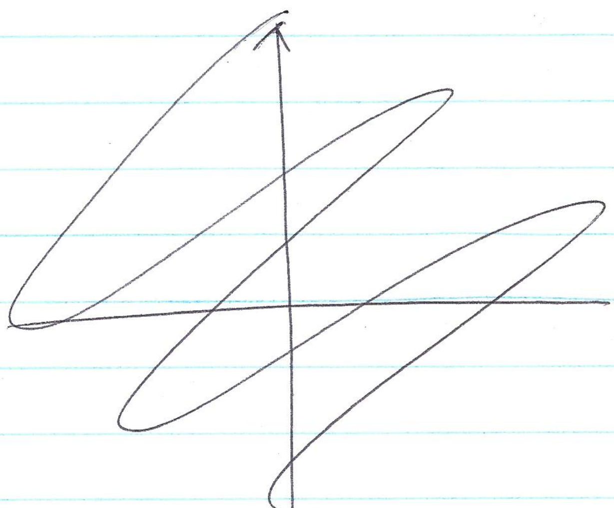


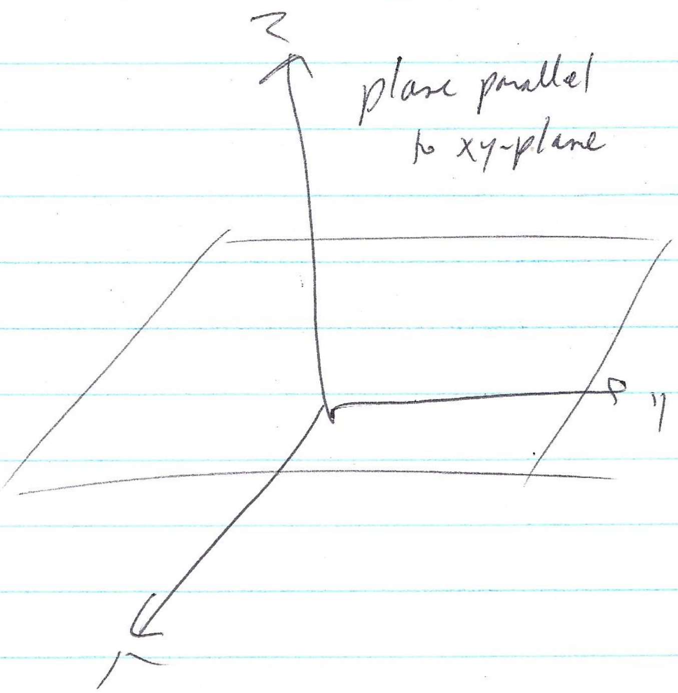



typical level surface

a sphere centred at origin

(36) $c = z$






plane parallel to xy-plane