MATH 253 – WORKSHEET 6
MULTIVARIABLE FUNCTIONS

(1) Find the domain of each of the following functions. Draw a diagram!

(a) $f(x, y) = \sqrt{1 - x^2 - y^2}$

Solution: The function is defined when $1 - x^2 - y^2 \geq 0$, equivalently when $x^2 + y^2 \leq 1$ – that is in the unit disc.

(b) $g(x, y) = \ln(x + y)$

Solution: The function is defined when $x + y > 0$, equivalently when $y > -x$ – that in the half-plane lying strictly above the line $y = -x$.

(c) $h(x, y) = \frac{1}{x^2 + y^2}$

Solution: The function is defined when $x^2 + y^2 \neq 0$, equivalently when $(x, y) \neq (0, 0)$ – that is in the plane punctured at the origin.

(d) $k(x, y) = e^{x^2 + y} + \sin\left(y^2 + 3x\right)$

Solution: The function is defined everywhere.