MA110 - Engineering Mathematics-1
Problem Sheet - 1

Domains and Ranges of Functions of Several Variables

1. Find the domain and range of the functions:

   (a) $\frac{1}{x+y}$

   (b) $\frac{x^2+y^2}{xy}$

   (c) $\cos xyz$

   (d) $\sqrt{9-x^2-y^2}$

   (e) $\frac{1}{x^2+y^2}$

   (f) $\frac{1+y^2}{x}$

2. Find the domain and its boundary, range, level curves for the function. Also determine whether the domain is closed or open with justification; bounded or unbounded.

   (a) $f(x,y) = \log(x^2+y^2)$ (b) $f(x,y) = y/x^2$ (c) $f(x,y) = \sqrt{y-x}$

3. Find an equation for the level curves/surfaces passing through the point and contours for the function

   (a) $f(x,y) = \sqrt{x^2-y}$, $(1,0)$ (b) $f(x,y,z) = \sqrt{x-y} - \log z$, $(3,-1,1)$

4. Does the function $f(x,y,z) = xy - z$ have a minimum value on the line

$$x = t-1, \quad y = t-2, \quad z = t+7.$$

   If so, what is it?

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