Worksheet-1
Course Name: Math-III (Section-A)
Total marks = 20
Date: 07/09/2022

1. $f(x,y) = \frac{1}{\sqrt{16-x^2-y^2}}$. (4)
   (a) Find the function's domain and range
   (b) Describe its level curves
   (c) Find the boundary of the function's domain
   (d) Determine if the domain is open, closed or neither and also if it is bounded or unbounded.
2. Find an equation for the level curve of the function $f(x,y) = 16 - x^2 - y^2$ that passes through the point $(2\sqrt{2}, \sqrt{2})$. (4)
3. Find an equation for the level surface of the function $f(x,y) = \ln(x^2 + y^2 + z^2)$ through the given point $(-1, 2, 1)$. (4)
4. (a) Give an example of a set which is open in R^2. (1)
   (b) Give an example of a set which is closed in R^2. (1)
   (c) Give two examples of sets which are neither open nor closed in R. (1+1)
5. Find the domain and range for the following functions: (4)
   (a) $w = \sqrt{x^2 - y}$
   (b) $w = \frac{1}{\sqrt{xy}-1}$
   (c) $w = \frac{1}{(x-1)^2+(y-1)^2+(z-1)^2}$
   (d) $w = \tan^{-1}(\frac{y}{x})$