Math 21C
Kouba
Discussion Sheet 7

1.) Graph each of the following equations in two-dimensional space.

a.) $y = 3$ b.) $x = -2$ c.) $y = x$ d.) $y = 3 - x$ e.) $y = x^3$

f.) $y = e^x$ g.) $y = \ln x$ h.) $y = \sqrt{x}$ i.) $x = y^2$ j.) $y = \dfrac{1}{x}$

2.) Sketch the level curves for each of the following equations (surfaces) using the following values of z : -3, -2, -1, 0, 1, 2, 3

a.) $z = y$ b.) $z = 1 - x - y$ c.) $z^2 = x^2 + y^2$ d.) $x^2 + y^2 + z^2 = 9$

3.) Sketch all three coordinate plane traces (i.e., $x = 0$, $y = 0$, and $z = 0$) for each of the following equations (surfaces).

a.) $x + 2y + 3z = 6$ b.) $z = x^2 + y^2$ c.) $z = y^2 - x^2$ d.) $z^2 = x^2 + y^2$

4.) Sketch in three-dimensional space each of the following equations (surfaces). Use intercepts,traces, and/or level curves, if necessary.

a.) $y = 3$ b.) $x = -2$ c.) $y = x$ d.) $y = 3 - x$ e.) $y = x^3$

f.) $y = e^x$ g.) $y = \ln x$ h.) $y = \sqrt{x}$ i.) $x = y^2$ j.) $y = \dfrac{1}{x}$

k.) $x^2 + y^2 + z^2 = 4$ l.) $x + 2y + 3z = 6$ m.) $z = x^2 + y^2$ n.) $z^2 = x^2 + y^2$

o.) $z^2 = x^2 + y^2 - 1$ p.) $z^2 = x^2 + y^2 + 1$ q.) $z = y^2 - x^2$

5.) a.) Consider the graph of $y = \ln(x - 1)$ in the xy-plane. Find an equation for the surface created by revolving this graph about the

i.) x-axis . ii.) y-axis .

b.) Consider the graph of $z = \sin x$ in the xz-plane. Find an equation for the surface created by revolving this graph about the

i.) x-axis . ii.) z-axis .

6.) Determine and sketch the domain of each function in 2D-Space and find the range of each function.

a.) $z = 1 + x^2 + y^2$ b.) $z = 1 - x^2 - y^2$
c.) $z = 1 - x^2 + y^2$ d.) $z = 1 - x - y$
e.) $f(x, y) = \sqrt{1 - x - y}$ f.) $f(x, y) = \sqrt{1 - x^2 - y^2}$
g.) $f(x, y) = 5 + e^{-x^2 - y^2}$ h.) $f(x, y) = 3 - \sqrt{y - \ln x}$
i.) $z = 3\cos x + 4\sin y$ j.) $z = 2 - 5\sin(\ln y)$

k.) $z = \ln(25 - x^2 - y^2)$ l.) $f(x,y) = \ln(x^2 + y^2 - 25)$

m.) $f(x,y) = \dfrac{7}{x^2 - y}$ n.) $f(x,y) = \dfrac{7}{x^2 + y^2}$

o.) $f(x,y) = \dfrac{8}{2 + \sqrt{x - 2y}}$ p.) $f(x,y) = \dfrac{8}{2 - \ln(x + y)}$

7.) Determine and sketch the domain of each function in 2D-Space.

a.) $f(x,y) = \ln(x^2 + y^2 - 4)$ b.) $f(x,y) = \ln(1 + x + y)$

c.) $f(x,y) = \dfrac{1}{4 - \sqrt{25 - x^2 - y^2}}$ d.) $f(x,y) = \sqrt{(x^2 - 4)(y^2 - 1)}$

********** The following problem is for recreational purposes only. **********

8.) A snail is at the bottom of a well which is 100 feet deep. Each day the snail climbs up 7 feet and down 5 feet. In how many days will the snail reach the top of the well ?