

Math 21C
Vogler
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.) $y = \frac{1}{x}$

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 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.) $y = \frac{1}{x}$
 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.) Sketch the domain of each function.

a.) $f(x, y) = \ln(x^2 + y^2 - 4)$ b.) $f(x, y) = \ln(1 + x + y)$
 c.) $f(x, y) = \frac{1}{4 - \sqrt{25 - x^2 - y^2}}$ d.) $f(x, y) = \sqrt{(x^2 - 4)(y^2 - 1)}$

7.) Evaluate the following limits or determine that the limit does not exist.

$$\begin{array}{ll}
\text{a.) } \lim_{(x,y) \rightarrow (0,0)} \frac{x^2 + y^2 - 4}{x + y + 2} & \text{b.) } \lim_{(x,y) \rightarrow (1,1)} \frac{xy - y - 2x + 2}{x - 1} \\
\text{c.) } \lim_{(x,y) \rightarrow (2,2)} \frac{x + y - 4}{\sqrt{x + y} - 2} & \text{d.) } \lim_{(x,y) \rightarrow (0,0)} \frac{\sin(x^2 + y^2)}{x^2 + y^2} \\
\text{e.) } \lim_{(x,y) \rightarrow (0,0)} \frac{x^3}{x^3 + y^3} & \text{f.) } \lim_{(x,y) \rightarrow (0,0)} \frac{xy}{x^2 + y^2} \quad \text{g.) } \lim_{(x,y) \rightarrow (0,0)} \frac{xy^2}{x^2 + y^4}
\end{array}$$

***** 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 ?