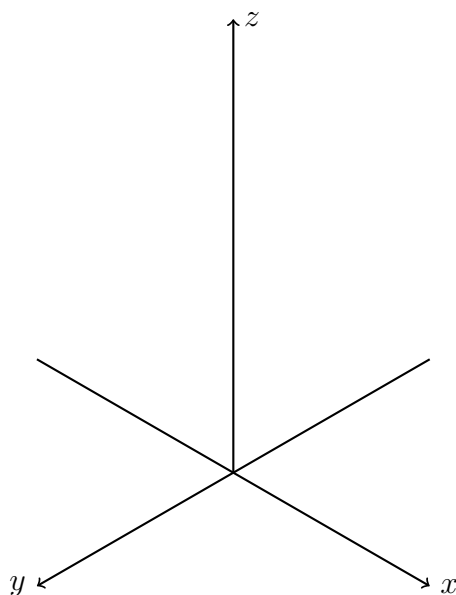Name:_____

§12.2 Graphs and Level Curves

1. Find the domain and the equations of 3 level curves of $f(x, y) = \ln(2x + 6y)$. Describe the level curves.
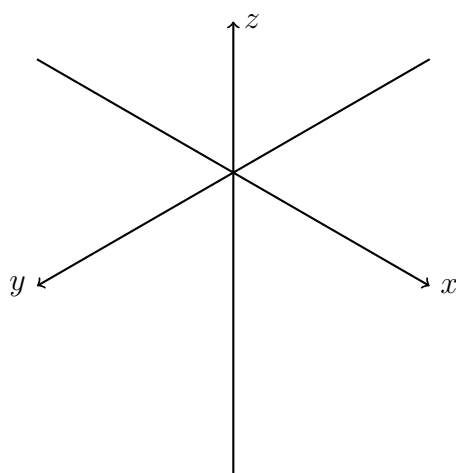
2. Find the domain and the equations of 3 level curves of $f(x, y) = \sqrt{100 - x^2 - y^2}$. Describe the level curves.

3. Sketch the surface $f(x, y) = \sqrt{x^2 + y^2}$

4. Sketch the surface $f(x, y) = 2 - x^2 - y^2$

5. A sample of matter has a temperature distribution given by $T(x, y, z) = \dfrac{x^2}{5} + \dfrac{y^2}{4} + \dfrac{z^2}{4}$. Describe the level surfaces and write an equation for the level surface $T = 400$.

6. Find the domain and the equations of 3 level curves of $f(x, y) = 4x^2 - y^2$. Describe the level curves.

§12.3   Limits and Continuity

7. Compute the limit: $\displaystyle\lim_{(x,y)\to(-2,-1)} \frac{xy}{2x^2 + y}$

8. Compute the limit: $\displaystyle\lim_{(x,y,z)\to(3,-5,-4)} \frac{e^{x+y+z}}{z - y}$

9. Show that the limit does not exist: $\displaystyle\lim_{(x,y)\to(0,0)} \frac{6x^2}{5y^2 - x^2}$

10. Determine all points at which the given function is continuous: $f(x,y) = \cot(\sqrt{1 - x^2 - y^2})$

11. Determine all points at which the given function is continuous: $f(x, y, z) = \sqrt{x - 8y^2 + 4z^2}$

12. Determine all points at which the given function is continuous: $f(x, y) = \begin{cases} \dfrac{x^3 + y^3}{x + y} & \text{if } x + y \neq 0, \\ -xy & \text{if } x + y = 0. \end{cases}$