MA 213 Worksheet #6
Section 12.6

1 *12.6.1* (a) What does the equation $y = x^2$ represent as a curve in $\mathbb{R}^2$.
(b) What does it represent as a surface in $\mathbb{R}^3$
(c) What does the equation $z = y^2$ represent?

2 *12.6.5* Describe and sketch the surface $z = 1 - y^2$.

3 Use traces to sketch and identify the surfaces.
   12.6.7 $xy = 1$
   12.6.11 $x = y^2 + 4z^2$.

4 *12.6.21-28* **On back**

5 *12.6.37* Reduce the equation $x^2 - y^2 + z^2 - 4x - 2z = 0$ to one of the standard forms, classify the surface, and sketch it.

Additional Recommended Problems

6 *12.6.9*

   (a) Find and identify the traces of the quadratic surface $x^2 + y^2 - z^2 = 1$.
   (b) If we change the equation in part (a) to $x^2 - y^2 + z^2 = 1$, how is the graph affected?
   (c) What if we change the equation in part (a) to $x^2 + y^2 + 2y - z^2 = 0$?

7 *12.6.35* Reduce the equation $x^2 + y^2 - 2x - 6y - z + 10 = 0$ to one of the standard forms, classify the surface, and sketch it.

8 *12.6.43* Sketch the region bounded by the surfaces $z = \sqrt{x^2 + y^2}$ and $x^2 + y^2 = 1$ for $1 \le z \le 2$.

9 *12.6.52* Show that the curve of intersection of the surfaces $x^2 + 2y^2 - z^2 + 3x = 1$ and $2x^2 + 4y^2 - 2z^2 - 5y = 0$ lies in a plane.

21–28 Match the equation with its graph (labeled I–VIII). Give reasons for your choice.

21. $x^2 + 4y^2 + 9z^2 = 1$ **22.** $9x^2 + 4y^2 + z^2 = 1$

23. $x^2 - y^2 + z^2 = 1$ **24.** $-x^2 + y^2 - z^2 = 1$

25. $y = 2x^2 + z^2$ **26.** $y^2 = x^2 + 2z^2$

27. $x^2 + 2z^2 = 1$ **28.** $y = x^2 - z^2$

I

II

III

IV

V

VI

VII

VIII