Calculus 2502A - Advanced Calculus I
Fall 2014
§12.6: Quadric surfaces

Martin Frankland

September 24, 2014

These notes present pictures of quadric surfaces whose equations are taken from Section 12.6 of the textbook. The pictures were produced using the open-source software Sage.

Warning. I kept the default viewpoint of 3D plots in Sage, which is *different* from the drawing convention used in class and in the textbook. The pictures here have the x-axis pointing to the bottom right and the y-axis pointing to the top right, "into the page".

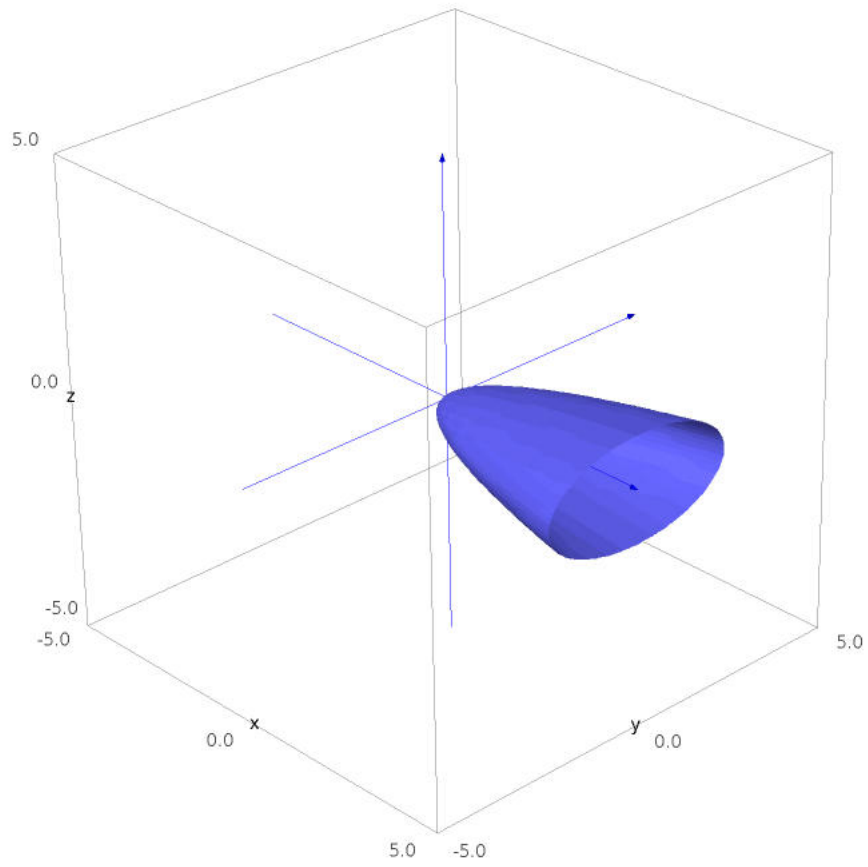**# 11.** $x = y^2 + 4z^2$

Figure 1: An elliptic paraboloid.
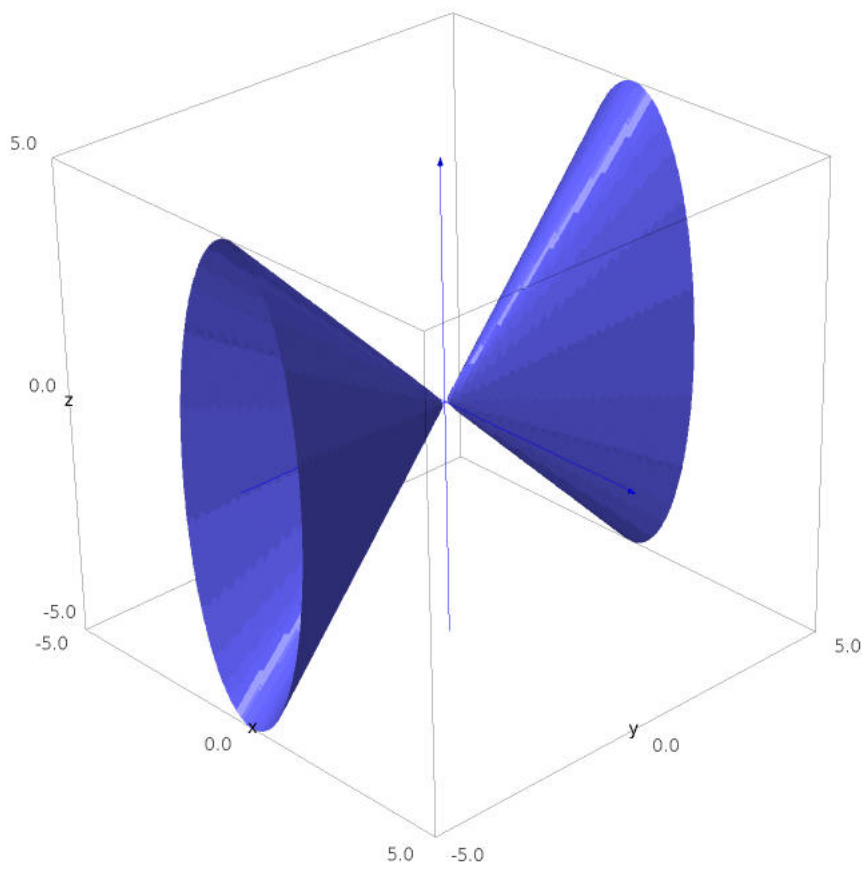
 # 12. $9x^2 - y^2 + z^2 = 0$

Figure 2: A cone.

13. $x^2 = y^2 + 4z^2$
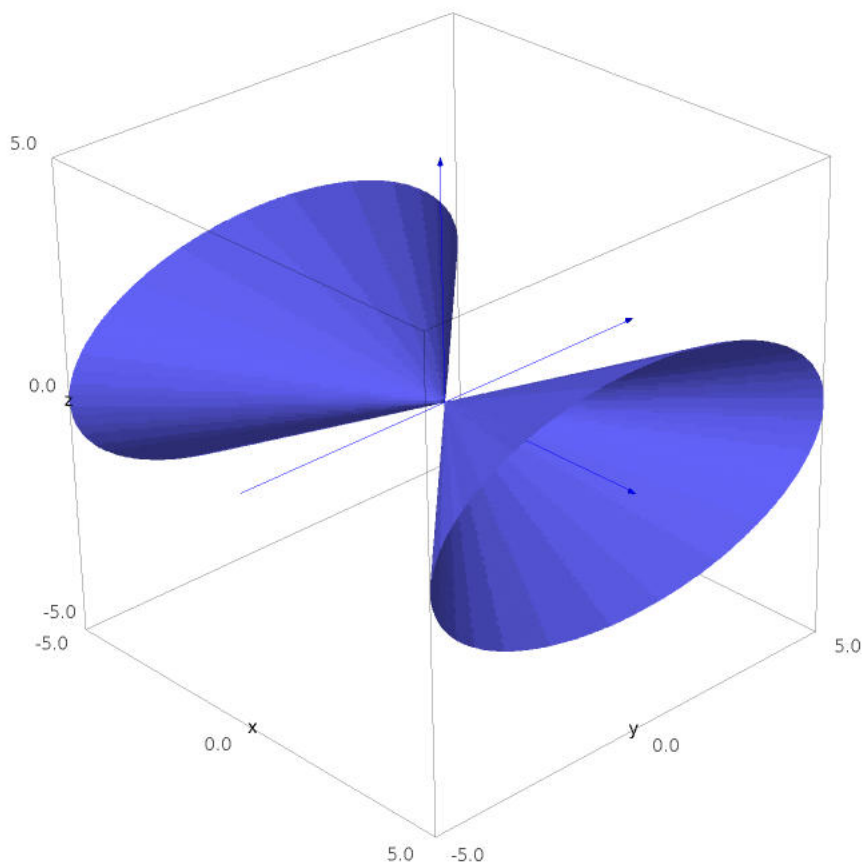

Figure 3: A cone.

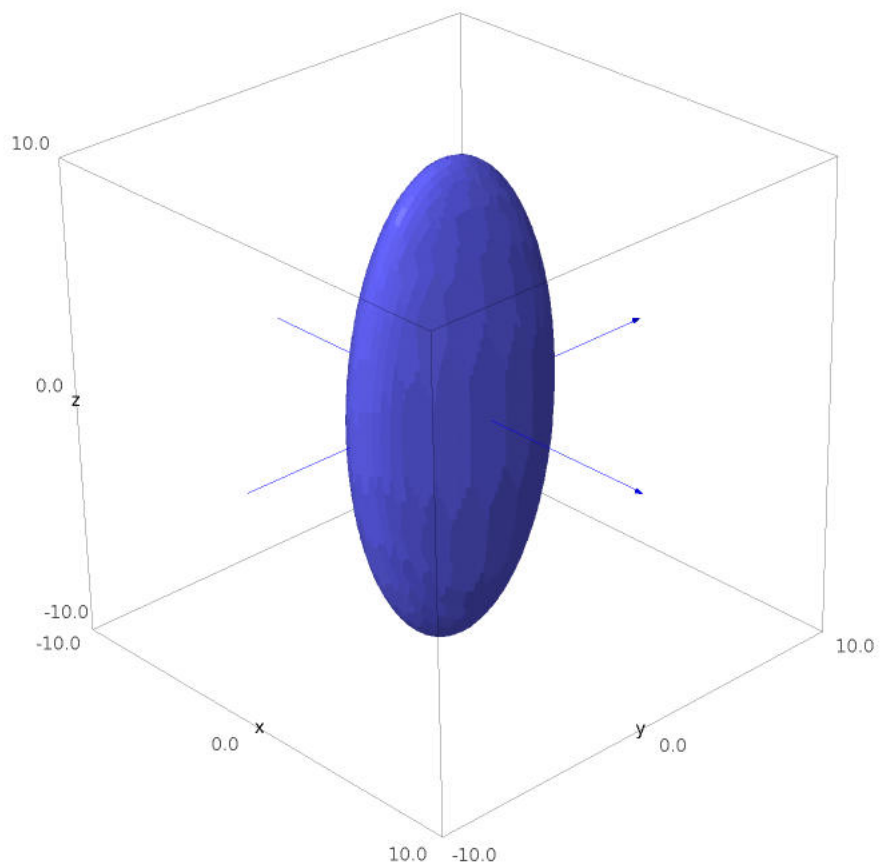# 14. $25x^2 + 4y^2 + z^2 = 100$

Figure 4: An ellipsoid.

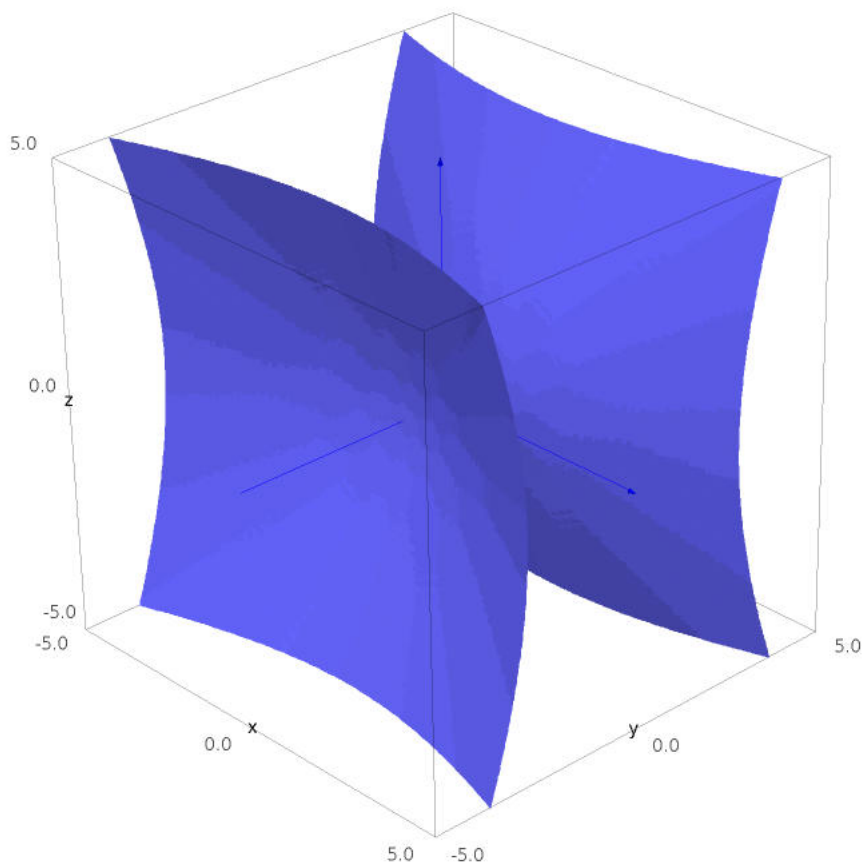**# 15.** $-x^2 + 4y^2 - z^2 = 4$

Figure 5: A hyperboloid of two sheets.
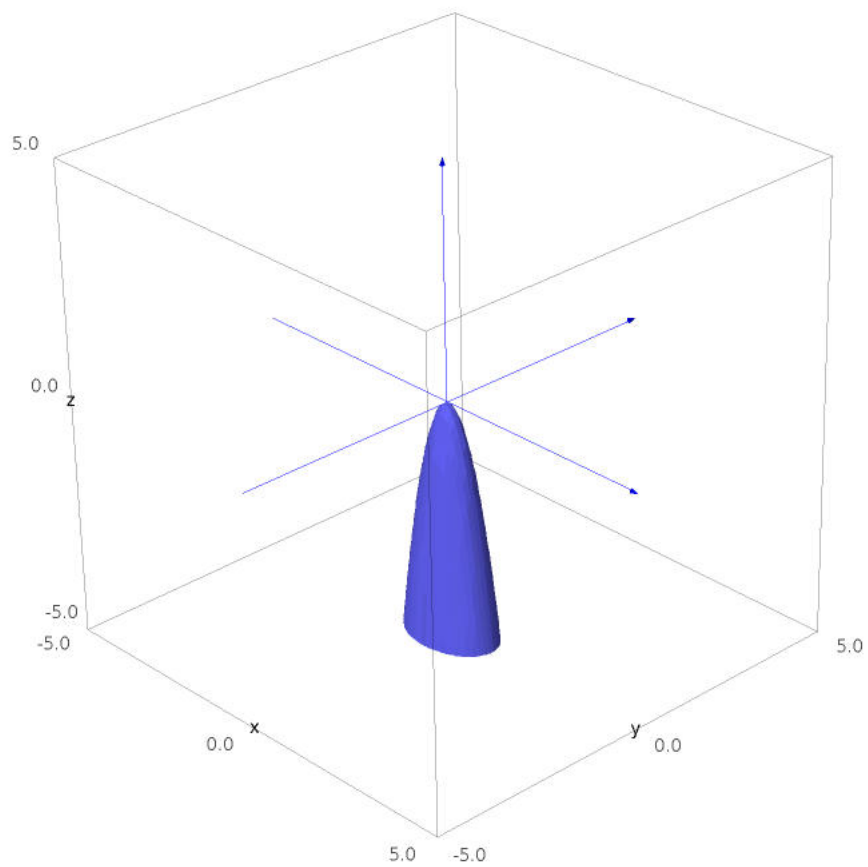
16. $4x^2 + 9y^2 + z = 0$

Figure 6: An elliptic paraboloid.
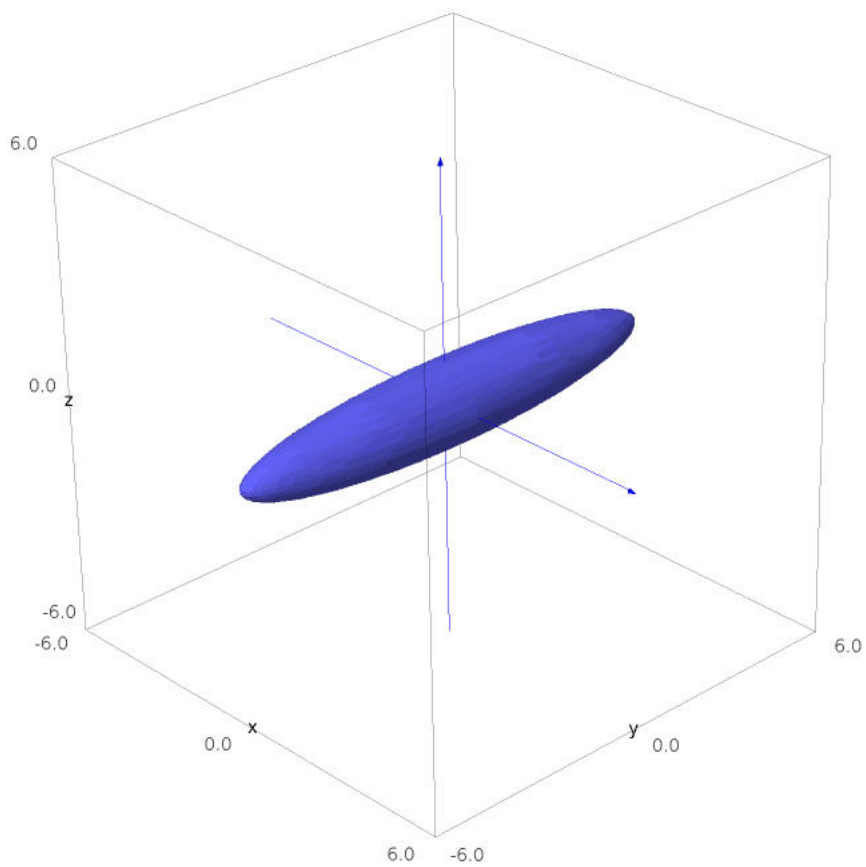
17. $36x^2 + y^2 + 36z^2 = 36$
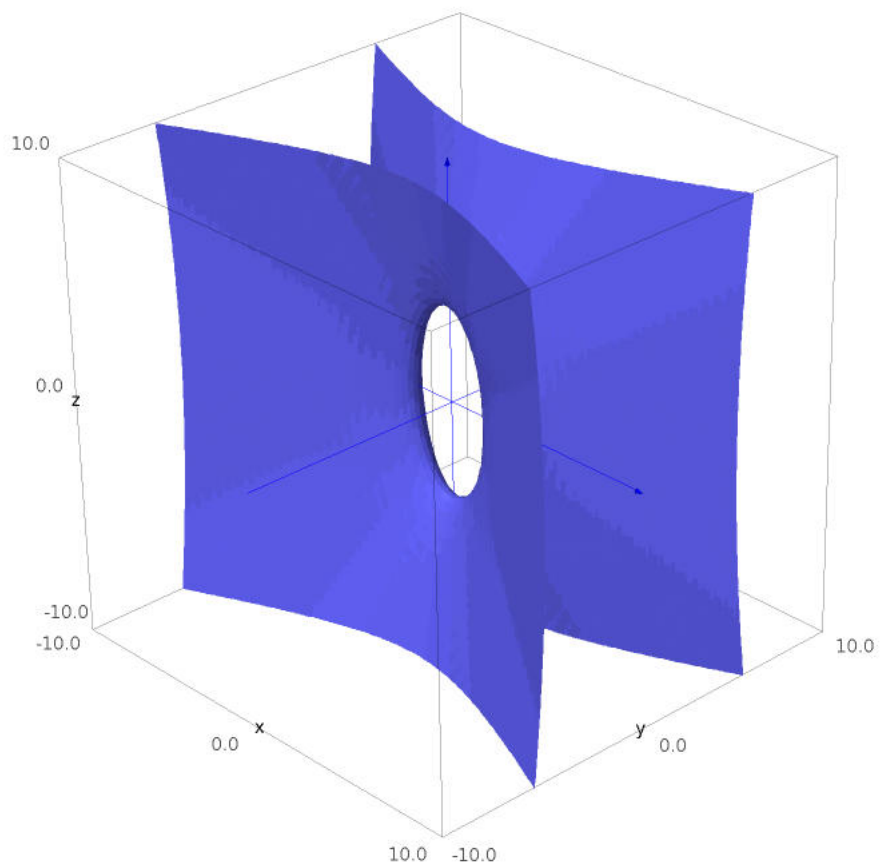

Figure 7: An ellipsoid.

18. $4x^2 - 16y^2 + z^2 = 16$

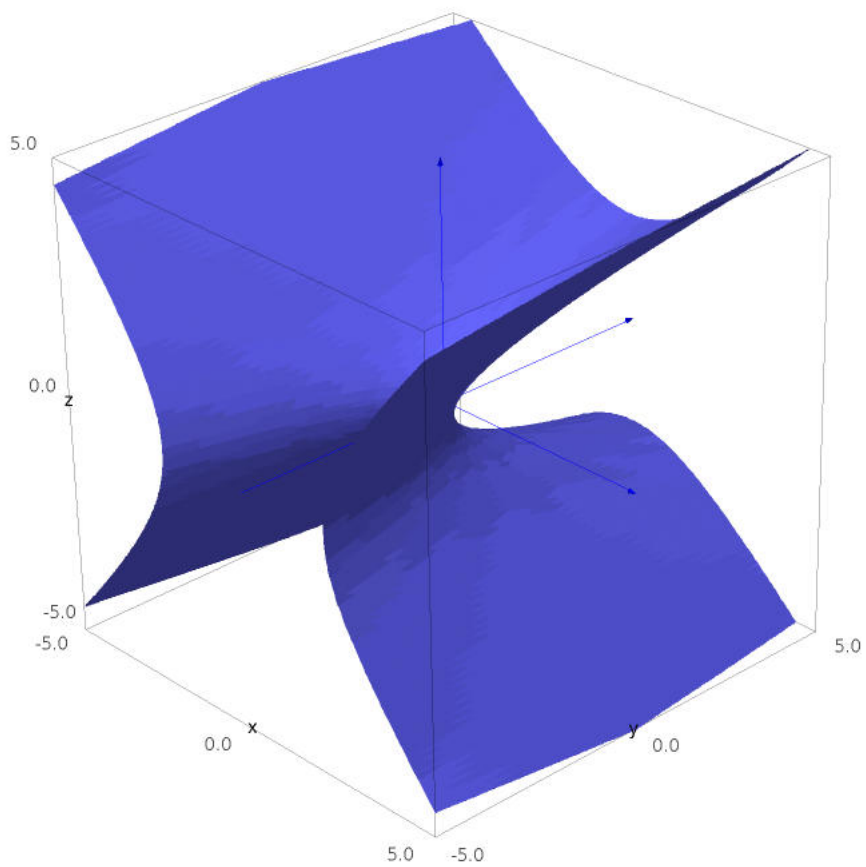Figure 8: A hyperboloid of one sheet.

 # 19. $y = z^2 - x^2$

Figure 9: An hyperbolic paraboloid.

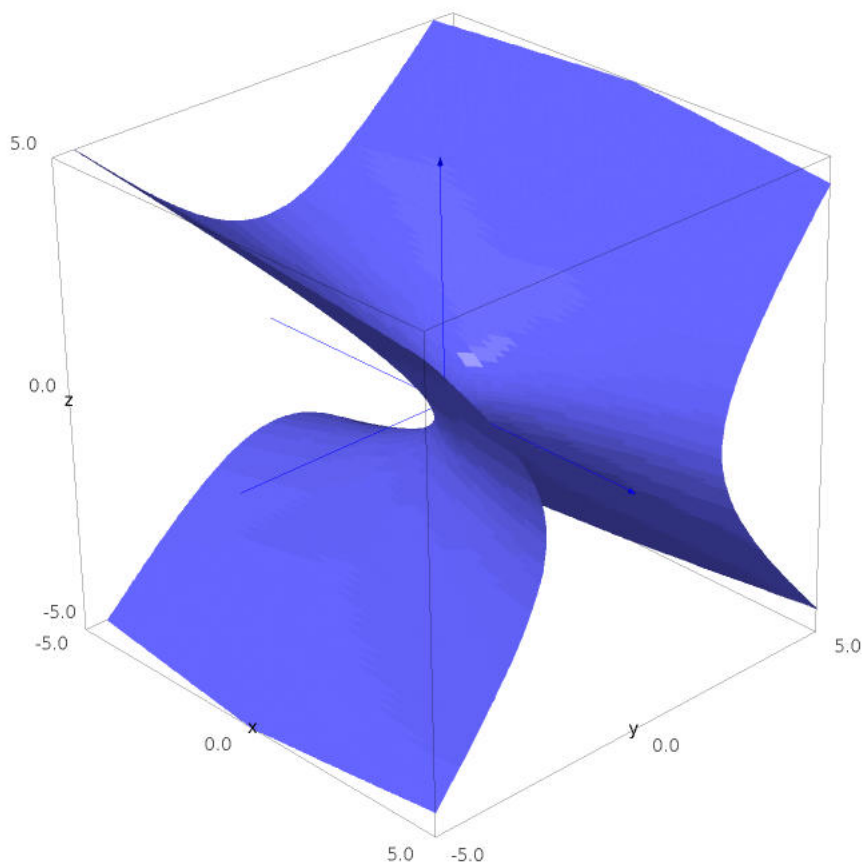**# 20.** $x = y^2 - z^2$

Figure 10: A hyperbolic paraboloid.

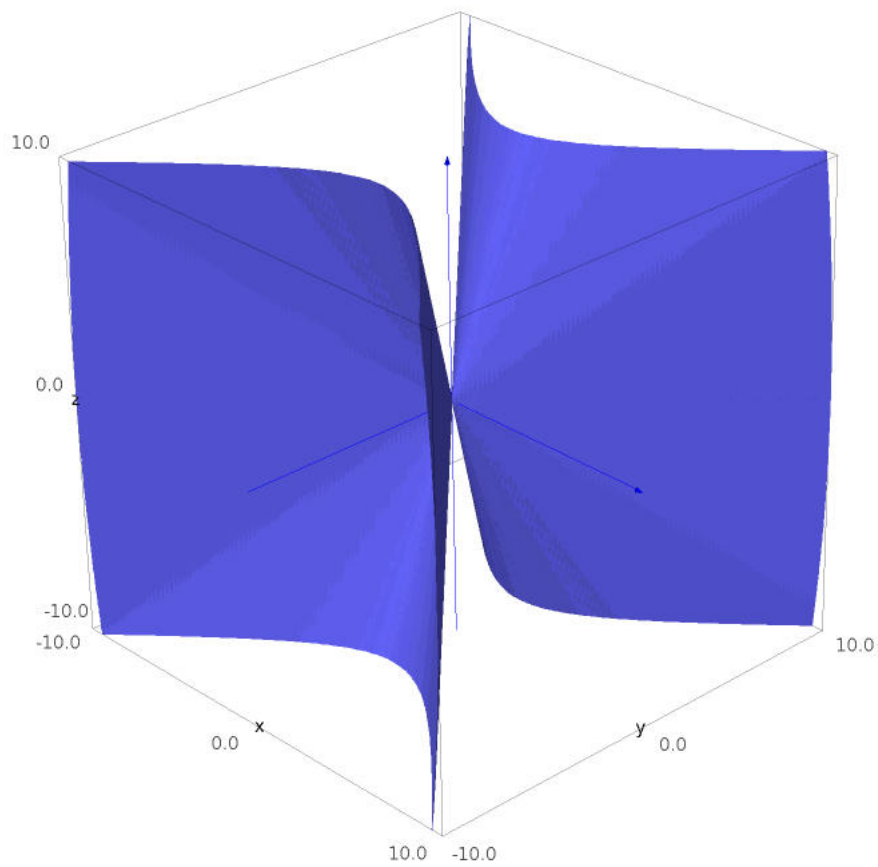**# 29.** $y^2 = x^2 + \frac{1}{9}z^2$

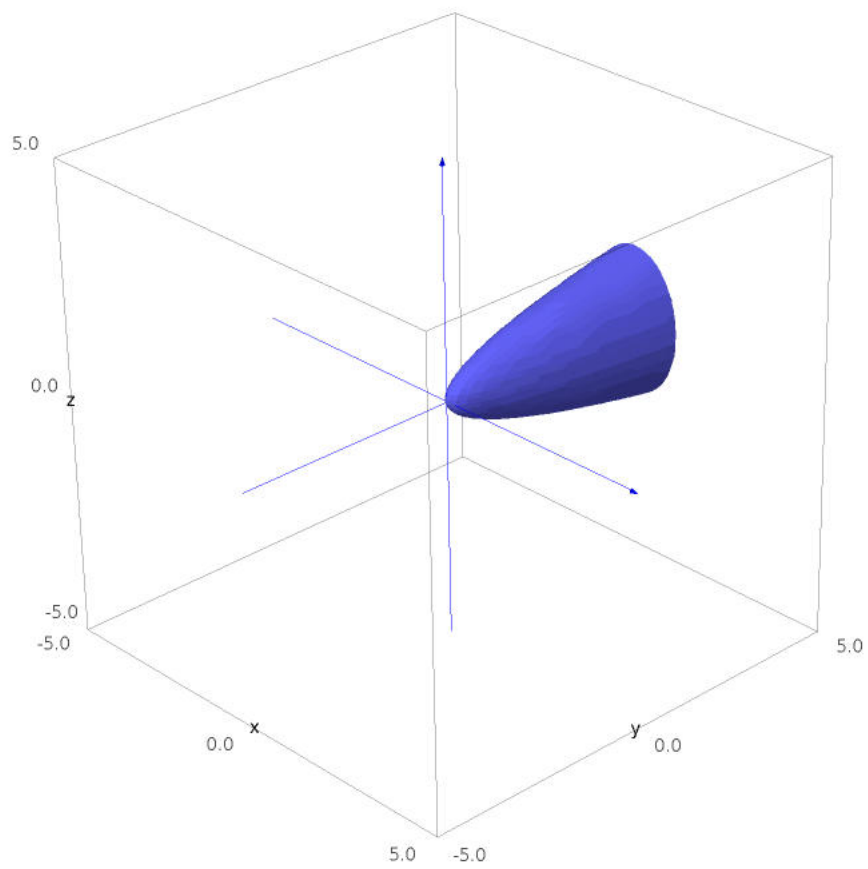Figure 11: A cone.

30. $4x^2 - y + 2z^2 = 0$

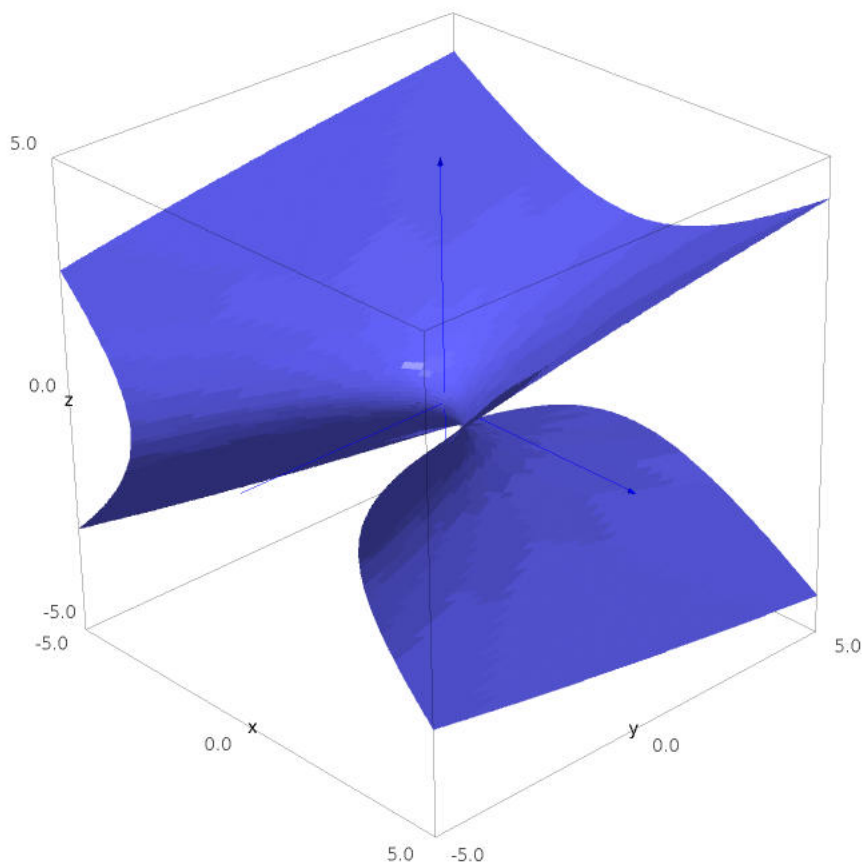Figure 12: An elliptic paraboloid.

 # 31. $x^2 + 2y - 2z^2 = 0$

Figure 13: A hyperbolic paraboloid.

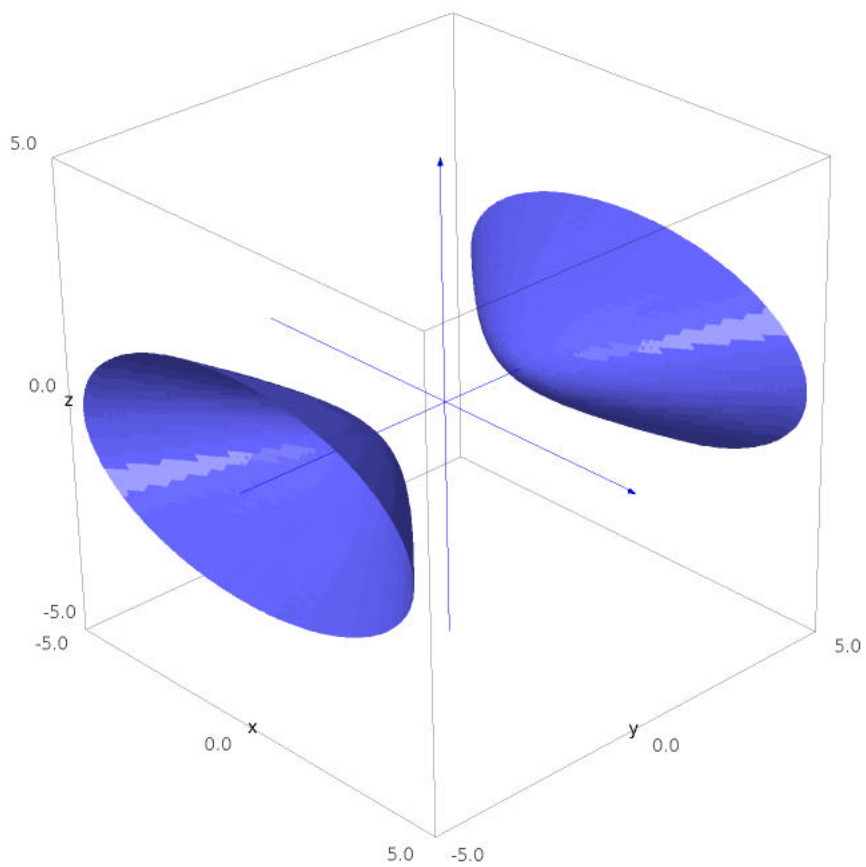**# 32.** $y^2 = x^2 + 4z^2 + 4$

Figure 14: A hyperboloid of two sheets.

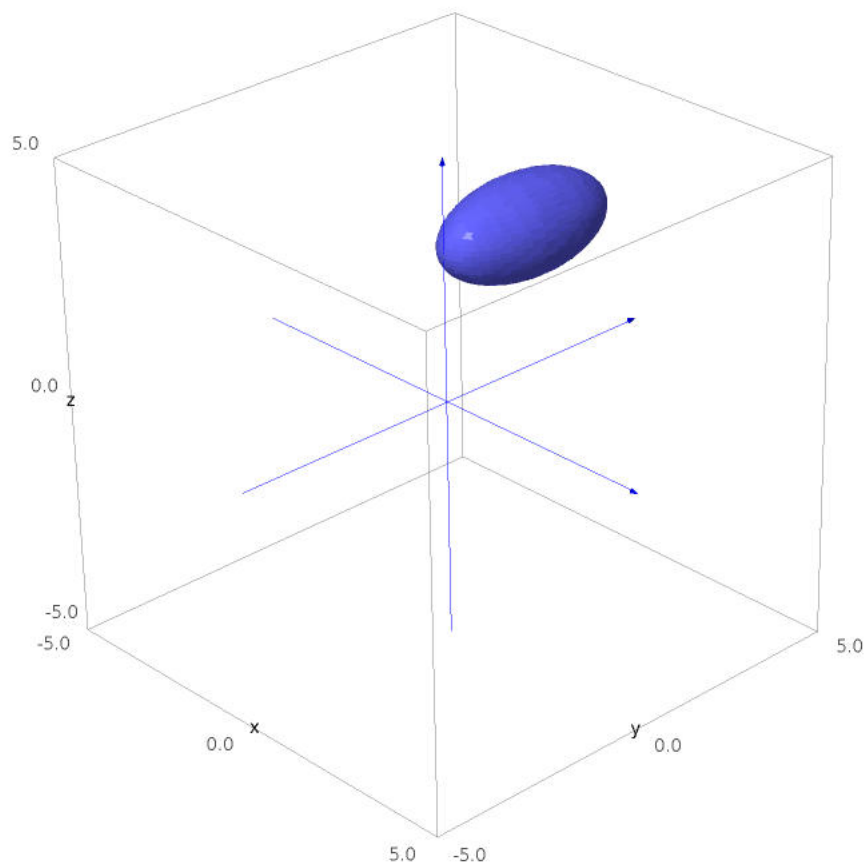**# 33.** $4x^2 + y^2 + 4z^2 - 4y - 24z + 36 = 0$

Figure 15: An ellipsoid.

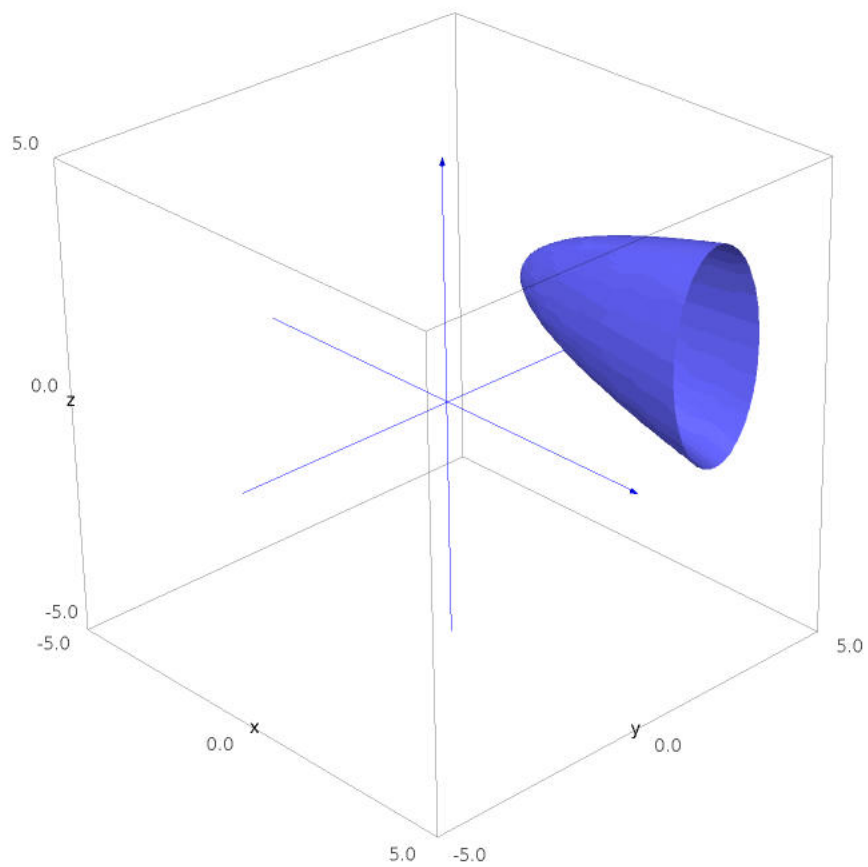# 34. $4y^2 + z^2 - x - 16y - 4z + 20 = 0$

Figure 16: An elliptic paraboloid.
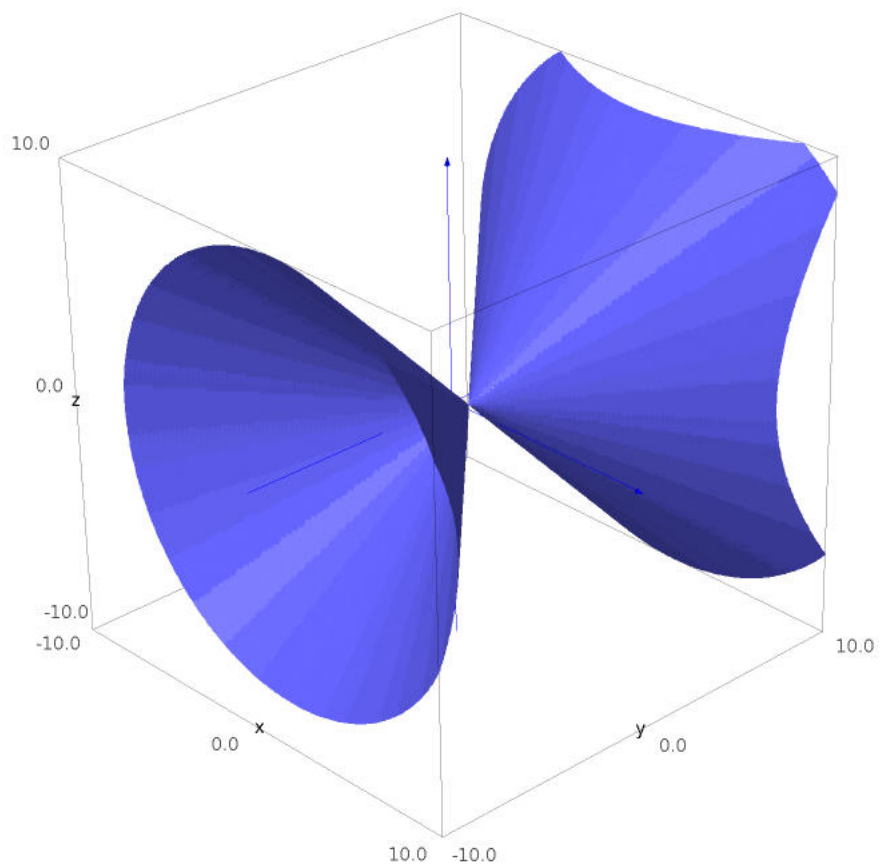
35. $x^2 - y^2 + z^2 - 4x - 2y - 2z + 4 = 0$
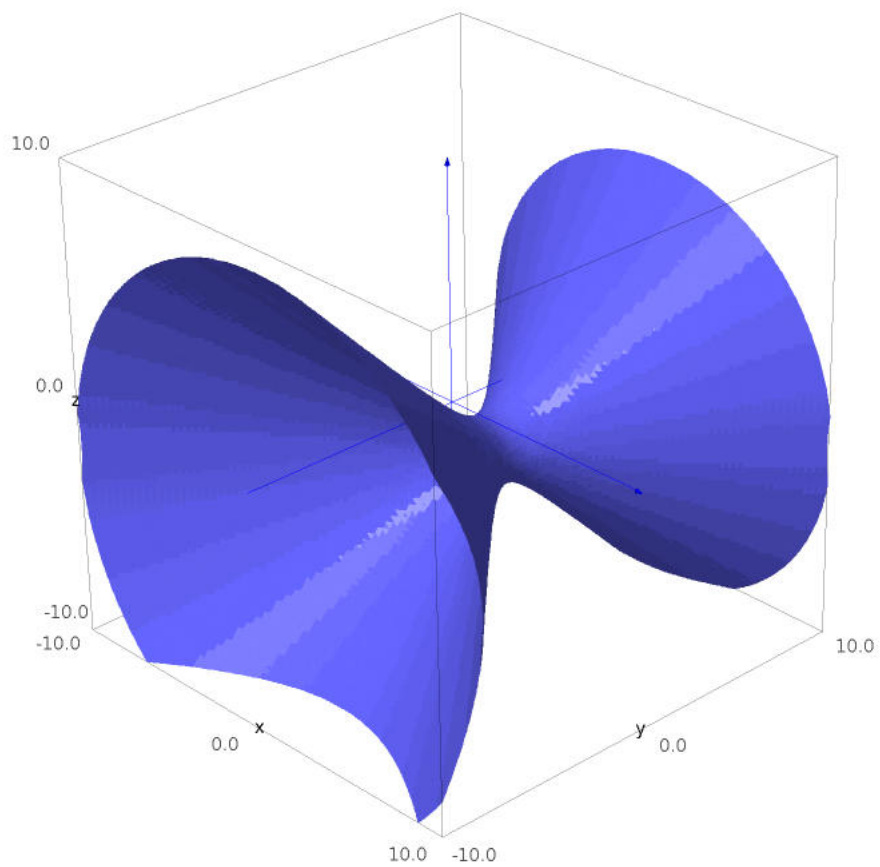

Figure 17: A cone.

 # 36. $\quad x^2 - y^2 + z^2 - 2x + 2y + 4z + 2 = 0$

Figure 18: A hyperboloid of one sheet.