**14.*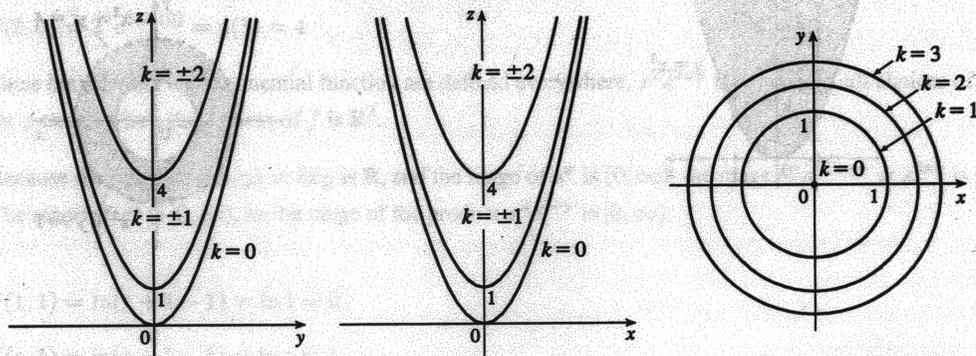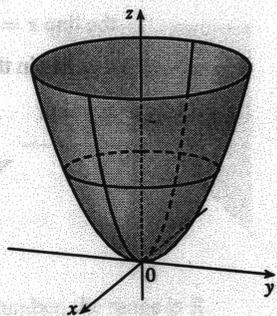* (a) The traces in $x = k$ are parabolas of the form $z = k^2 + y^2$, the traces in $y = k$ are parabolas of the form $z = x^2 + k^2$, and the traces in $z = k$ are circles $x^2 + y^2 = k$, $k \geq 0$.



Combining these traces we form the graph.

18. The equation of the graph is $z = x^2 - y^2$. The traces in $x = k$ are $z = -y^2 + k^2$, a family of parabolas opening downward. In $y = k$, we have $z = x^2 - k^2$, a family of parabolas opening upward. The traces in $z = k$ are $x^2 - y^2 = k$, a family of hyperbolas. The surface is a hyperbolic paraboloid with saddle point $(0, 0, 0)$.
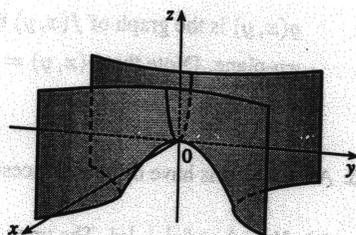
20. For $y = x^2 + z^2$, the traces in $x = k$ are $y = z^2 + k^2$, a family of parabolas opening in the positive y-direction. The traces in $y = k$ are $x^2 + z^2 = k$, $k \geq 0$, a family of circles. The traces in $z = k$ are $y = x^2 + k^2$, a family of parabolas opening in the positive y-direction. We recognize the graph as a circular paraboloid with axis the y-axis.
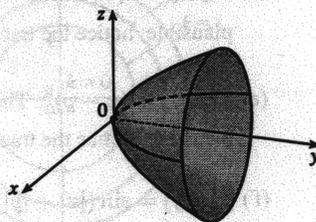
22. Completing the square in x gives $(x - 1)^2 + 4y^2 + z^2 = 1$ or $(x - 1)^2 + \dfrac{y^2}{(1/2)^2} + z^2 = 1$, an ellipsoid with center $(1, 0, 0)$ and intercepts $(0, 0, 0)$, $(2, 0, 0)$.
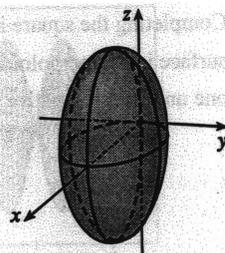
26. (a) The traces of $-x^2 - y^2 + z^2 = 1$ in $x = k$ are $-y^2 + z^2 = 1 + k^2$, a family of hyperbolas, as are the traces in $y = k$, $-x^2 + z^2 = 1 + k^2$. The traces in $z = k$ are $x^2 + y^2 = k^2 - 1$, a family of circles for $|k| > 1$. As $|k|$ increases, the radii of the circles increase; the traces are empty for $|k| < 1$. This behavior, combined with the vertical traces, gives the graph of the hyperboloid of two sheets in Table 2.

(b) The graph has the same shape as the hyperboloid in part (a) but is rotated so that its axis is the x-axis. Traces in $x = k$, $|k| > 1$, are circles, while traces in $y = k$ and $z = k$ are hyperbolas.