42. \[ z = 2 - x^2 - y^2 \]
\[ z = x^2 + y^2 \]

43. The surface is a paraboloid of revolution (circular paraboloid) with vertex at the origin, axis the \( y \)-axis and opens to the right. Thus the trace in the \( yz \)-plane is also a parabola: \( y = x^2, \ x = 0 \). The equation is \( y = x^2 + z^2 \).

44. The surface is a right circular cone with vertex at \((0, 0, 0)\) and axis the \( x \)-axis. For \( x = k \neq 0 \), the trace is a circle with center \((k, 0, 0)\) and radius \( r = y = \frac{x}{3} = \frac{k}{3} \). Thus the equation is \((x/3)^2 = y^2 + z^2\) or \(x^2 = 9y^2 + 9z^2\).

45. Let \( P = (x, y, z) \) be an arbitrary point equidistant from \((-1, 0, 0)\) and the plane \( x = 1 \). Then the distance from \( P \) to \((-1, 0, 0)\) is \( \sqrt{(x + 1)^2 + y^2 + z^2} \) and the distance from \( P \) to the plane \( x = 1 \) is \( |x - 1|/\sqrt{1^2} = |x - 1| \).

(by Equation 12.5.9). So \( |x - 1| = \sqrt{(x + 1)^2 + y^2 + z^2} \) \( \Leftrightarrow \) \((x - 1)^2 = (x + 1)^2 + y^2 + z^2 \) \( \Leftrightarrow \) \(x^2 - 2x + 1 = x^2 + 2x + 1 + y^2 + z^2 \) \( \Leftrightarrow \) \(-4x = y^2 + z^2 \). Thus the collection of all such points \( P \) is a circular paraboloid with vertex at the origin, axis the \( x \)-axis, which opens in the negative direction.
46. Let $P = (x, y, z)$ be an arbitrary point whose distance from the $x$-axis is twice its distance from the $yz$-plane. The distance from $P$ to the $x$-axis is $\sqrt{(x-x)^2 + y^2 + z^2} = \sqrt{y^2 + z^2}$ and the distance from $P$ to the $yz$-plane ($x = 0$) is $|x| / 1 = |x|$. Thus $\sqrt{y^2 + z^2} = 2|x| \Rightarrow y^2 + z^2 = 4x^2 \Rightarrow x^2 = (y^2/2^2) + (z^2/2^2)$. So the surface is a right circular cone with vertex the origin and axis the $x$-axis.