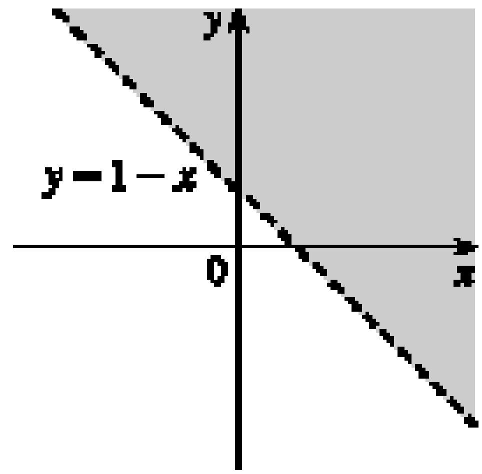
9.6: 2, 4, 8, 12, 14

2. Graph III has these traces. One indication is found by noting that the higher z-values occur for negative values of y in the traces in $x = 1$ and $x = 2$, and for positive values of x in the traces in $y = -1$ and $y = -2$. Thus the graph should have a "hill" over the fourth quadrant of the xy-plane. Similarly, we should expect a "valley" corresponding to the second quadrant of the xy-plane.

4. (a) $f(1, 1) = \ln(1 + 1 - 1) = \ln 1 = 0$

(b) $f(e, 1) = \ln(e + 1 - 1) = \ln e = 1$

(c) $\ln(x + y - 1)$ is defined only when $x + y - 1 > 0$, that is, $y > 1 - x$. So the domain of f is $\{(x, y) \mid y > 1 - x\}$.



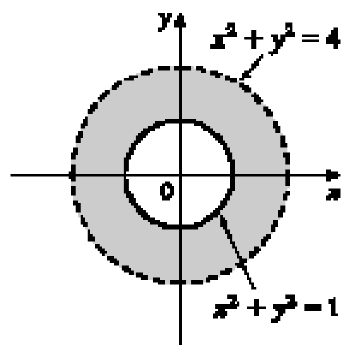
(d) Since $\ln(x + y - 1)$ can be any real number, the range is $\mathbb{R}$.

8. f is defined only when

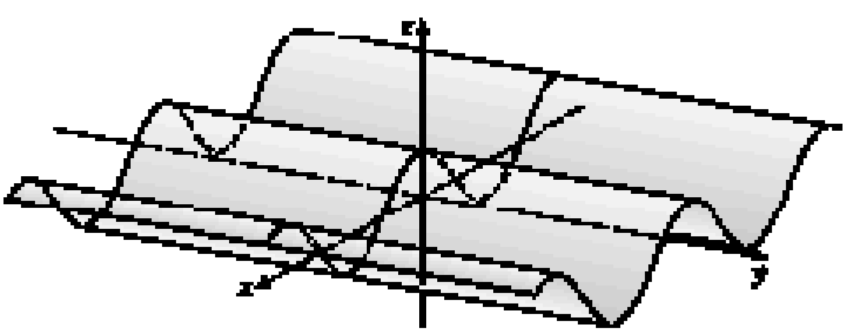
$x^2 + y^2 - 1 \geq 0 \quad \Rightarrow \quad x^2 + y^2 \geq 1$ and

$4 - x^2 - y^2 > 0 \quad \Rightarrow \quad x^2 + y^2 < 4.$

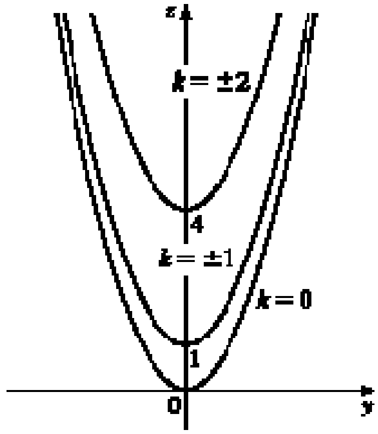
Thus $D = \{(x, y) \mid 1 \leq x^2 + y^2 < 4\}$.

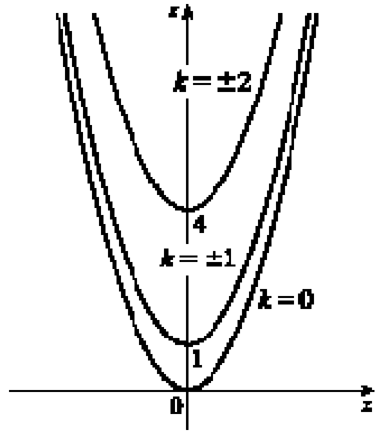


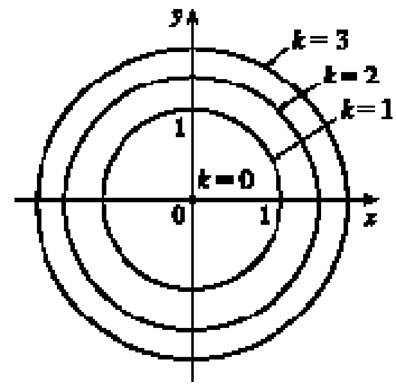
12. $z = \cos x$, a "wave."



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.