

9. (a) $g(2, -1) = \cos(2 + 2(-1)) = \cos(0) = 1$

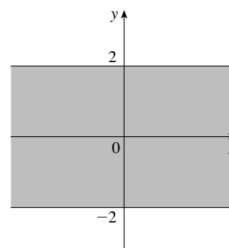
(b) $x + 2y$ is defined for all choices of values for x and y and the cosine function is defined for all input values, so the domain of g is \mathbb{R}^2 .

(c) The range of the cosine function is $[-1, 1]$ and $x + 2y$ generates all possible input values for the cosine function, so the range of $\cos(x + 2y)$ is $[-1, 1]$.

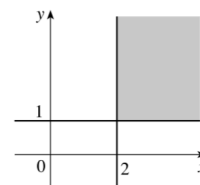
10. (a) $F(3, 1) = 1 + \sqrt{4 - 1^2} = 1 + \sqrt{3}$

(b) $\sqrt{4 - y^2}$ is defined only when $4 - y^2 \geq 0$, or $y^2 \leq 4 \Leftrightarrow -2 \leq y \leq 2$. So the domain of F is $\{(x, y) \mid -2 \leq y \leq 2\}$.

(c) We know $0 \leq \sqrt{4 - y^2} \leq 2$ so $1 \leq 1 + \sqrt{4 - y^2} \leq 3$. Thus the range of F is $[1, 3]$.



13. $\sqrt{x - 2}$ is defined only when $x - 2 \geq 0$, or $x \geq 2$, and $\sqrt{y - 1}$ is defined only when $y - 1 \geq 0$, or $y \geq 1$. So the domain of f is $\{(x, y) \mid x \geq 2, y \geq 1\}$.

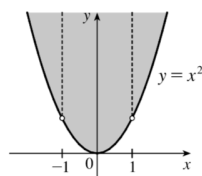


19. $\sqrt{y - x^2}$ is defined only when $y - x^2 \geq 0$, or $y \geq x^2$.

In addition, f is not defined if $1 - x^2 = 0 \Leftrightarrow$

$x = \pm 1$. Thus the domain of f is

$\{(x, y) \mid y \geq x^2, x \neq \pm 1\}$.



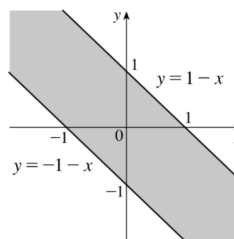
20. $\sin^{-1}(x + y)$ is defined only when $-1 \leq x + y \leq 1 \Leftrightarrow$

$-1 - x \leq y \leq 1 - x$. Thus the domain of f is

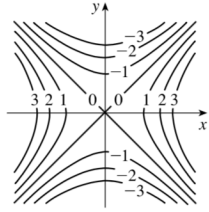
$\{(x, y) \mid -1 - x \leq y \leq 1 - x\}$, consisting of those

points on or between the parallel lines $y = -1 - x$ and

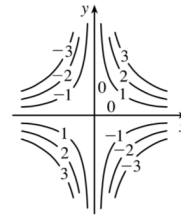
$y = 1 - x$.



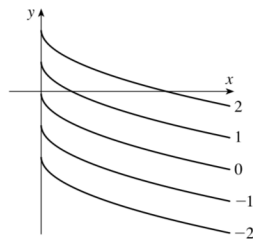
45. The level curves are $x^2 - y^2 = k$. When $k = 0$ the level curve is the pair of lines $y = \pm x$, and when $k \neq 0$ the level curves are a family of hyperbolas (oriented differently for $k > 0$ than for $k < 0$).



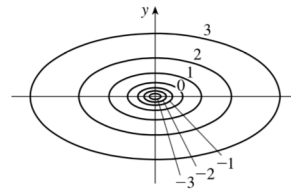
46. The level curves are $xy = k$ or $y = k/x$. When $k \neq 0$ the level curves are a family of hyperbolas. When $k = 0$ the level curve is the pair of lines $x = 0, y = 0$.



47. The level curves are $\sqrt{x} + y = k$ or $y = -\sqrt{x} + k$, a family of vertical translations of the graph of the root function $y = -\sqrt{x}$.



48. The level curves are $\ln(x^2 + 4y^2) = k$ or $x^2 + 4y^2 = e^k$, a family of ellipses.



72. (a) The graph of g is the graph of f shifted 2 units in the positive x -direction.
 (b) The graph of g is the graph of f shifted 2 units in the negative y -direction.
 (c) The graph of g is the graph of f shifted 3 units in the negative x -direction and 4 units in the positive y -direction.