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 \( y^2 \leq 4 \), \(-2 \leq y \leq 2 \). 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 \(-1 \leq x + y \leq 1 \), \(-1 - x \leq y \leq 1 - x \). 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.