1. Determine whether the function is one-to-one. If the function is one-to-one, prove it, as in the video.

   (a) $f(x) = x^2$ (b) $f(x) = x^3$ (c) $f(x) = x^3 + 2$

   (d) $f(x) = |x + 3|$ (e) $f(x) = x$ (f) $f(x) = 2x + 3$

   (g) $f(x) = \dfrac{x-2}{1-x}$ (h) $f(x) = \dfrac{2x-5}{x+1}$ (i) $f(x) = \dfrac{4x+1}{x-4}$

2. Prove that each of the following functions are one-to-one, as in the video, and then find the inverse.

   (a) $f(x) = 6x - 2$ (b) $f(x) = 42 - x$ (c) $f(x) = \dfrac{x-2}{3} + 4$

   (d) $f(x) = 1 - \dfrac{4+3x}{5}$ (e) $f(x) = \dfrac{3}{4-x}$ (f) $f(x) = \dfrac{x}{1-3x}$

   (g) $f(x) = \dfrac{2x-1}{3x+4}$ (h) $f(x) = \dfrac{4x+2}{3x-6}$ (i) $f(x) = \dfrac{-3x-2}{x+3}$

Answers

1. The one-to-one functions are: (b), (c), (e), (f), (g), (h), (i).

2. (a) $f^{-1}(x) = \dfrac{x+2}{6}$ (b) $f^{-1}(x) = 42 - x$ (c) $f^{-1}(x) = 3x - 10$

   (d) $f^{-1}(x) = -\dfrac{5}{3}x + \dfrac{1}{3}$ (e) $f^{-1}(x) = \dfrac{4x-3}{x}$ (f) $f^{-1}(x) = \dfrac{x}{3x+1}$

   (g) $f^{-1}(x) = \dfrac{4x+1}{2-3x}$ (h) $f^{-1}(x) = \dfrac{6x+2}{3x-4}$ (i) $f^{-1}(x) = \dfrac{-3x-2}{x+3}$