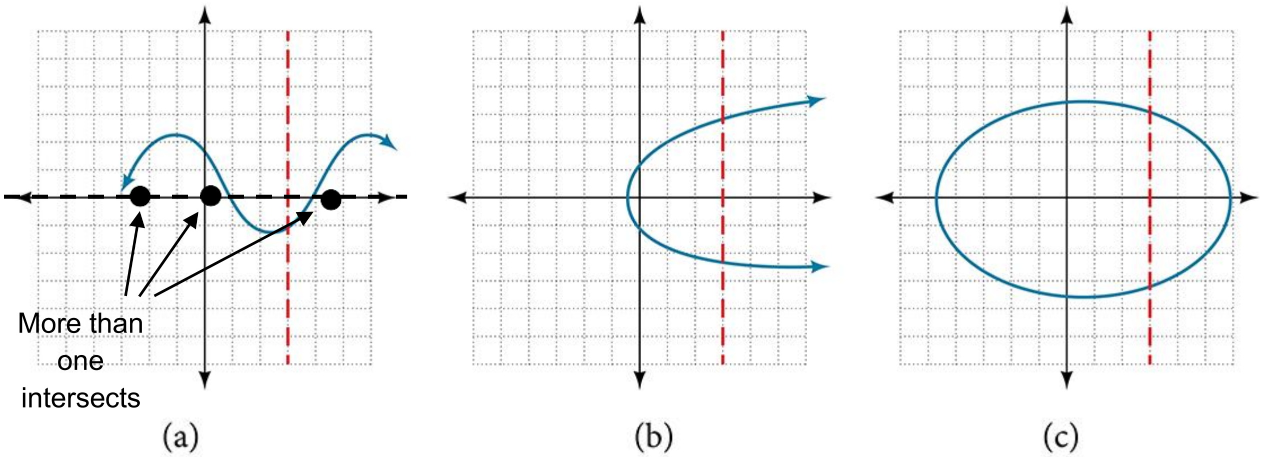
3.2 Answer Key

Practice 3.2-1-1:

Identify if the graph is one to one function.



Answer:

a) function but not one-to-one.

b) not a function.

c) not a function.

Practice 3.2-2-1:

Identify the domain and range of the given function. Then, find its inverse function and determine the domain and range of the inverse.

$$f(x) = \frac{2+x}{3}$$

Domain of $f(x) = \frac{2+x}{3}$

$3 \neq 0$ true, thus x is all real numbers $(-\infty, \infty)$.

Range of $f(x) = \frac{2+x}{3}$

Since there is no restriction for domain, thus range is all real numbers $(-\infty, \infty)$.

Inverse function of $f(x) = \frac{2+x}{3}$

Step 1: Substitute the function name for y, if needed.

$$\overset{\mathbf{y}}{\cancel{\mathbf{f(x)}}} = \frac{\mathbf{2+x}}{\mathbf{3}}$$

$$\mathbf{y} = \frac{\mathbf{2+x}}{\mathbf{3}}$$

Step 2: Replace x with y, and y with x.

$$\mathbf{x} = \frac{\mathbf{2+y}}{\mathbf{3}}$$

Step 3: Isolate y.

$$\mathrm{x} = \frac{2+\mathrm{y}}{3}$$

$$(\mathbf{3})\mathbf{x} = \frac{\mathbf{2+y}}{\mathbf{3}}(\mathbf{3})$$

$$3\mathrm{x} = 2 + \mathrm{y}$$

$$3\mathrm{x} - 2 = \mathrm{y}$$

$$\mathrm{y} = 3\mathrm{x} - 2$$

Step 4: use $\mathbf{f^{-1}}$ substitute the y.

$$\overset{\boldsymbol{f^{-1}(x)}}{\cancel{\mathrm{y}}} = 3\mathrm{x} - 2$$

$$f^{-1}(x) = 3\mathrm{x} - 2$$

Domain of the inverse function
$f^{-1}(x)$ is $(-\infty, \infty)$, range of the original function

Range of the inverse function

$f^{-1}(x)$ is $(-\infty, \infty)$, domain of the original function

Practice 3.2-3-1:

Determining Inverse Relationships for Power Functions

If $f(x) = x^3$ (the cube function) and $g(x) = \frac{1}{3}x$, is $g = f^{-1}$?

Solution:

$$f\big(g(x)\big) = \frac{x^3}{27} \neq x$$

No, the functions are not inverses.

Analysis

The correct inverse to the cube is, of course, the cube root $\sqrt[3]{x} = x^{\frac{1}{3}}$, that is, the one-third is an exponent, not a multiplier.