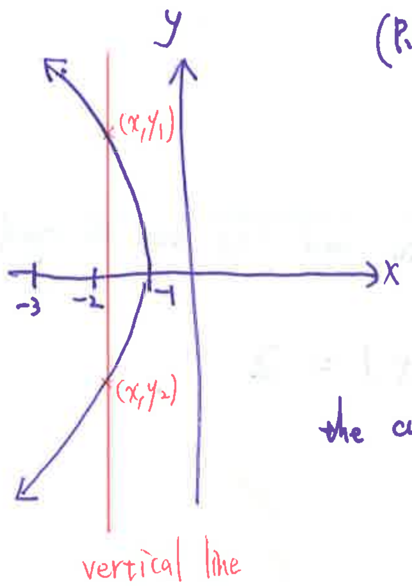
1.5 ※ 46.

State whether the curve is the graph of a function.

If it is, give the domain and the range.



(P.26) A curve C which intersects each vertical line at most once is the graph of a function.

the curve is not the graph of a function.

1.5 ※ 30.

Form the composition $f \circ g$ and give the domain.

$f(x) = \sqrt{1-x}$, $x \le 1$

$g(x) = 2\cos x$, $0 \le x \le 2\pi$

(P.43)

$(f \circ g)(x) = f(g(x))$

$\mathrm{dom}(f \circ g) = \{ x \in \mathrm{dom}(g) \mid g(x) \in \mathrm{dom}(f) \}$

(1)

$(f \circ g)(x) = f(g(x)) = f(2\cos x) = \sqrt{1 - 2\cos x}$, $\mathrm{dom}(f \circ g) = [\frac{\pi}{3}, \frac{5\pi}{3}]$

since $g(x) \in \mathrm{dom}(f) \Rightarrow 2\cos x \le 1 \Rightarrow \cos x \le \frac{1}{2}$ and $0 \le x \le 2\pi$ $(x \in \mathrm{dom}(g))$

$\Rightarrow \frac{\pi}{3} \le x \le \frac{5\pi}{3}$

(2)

$(g \circ f)(x) = g(f(x)) = g(\sqrt{1-x}) = 2\cos(\sqrt{1-x})$, $\mathrm{dom}(g \circ f) = [-4\pi^2 + 1, 1]$

$\mathrm{dom}(g \circ f) = \{ x \in \mathrm{dom}(f) \mid f(x) \in \mathrm{dom}(g) \}$

since $f(x) \in \mathrm{dom}(g) \Rightarrow 0 \le \sqrt{1-x} \le 2\pi \Rightarrow 0 \le 1 - x \le 4\pi^2 \Rightarrow -4\pi^2 + 1 \le x \le 1$

and $x \le 1$ $(x \in \mathrm{dom}(f)) \Rightarrow -4\pi^2 + 1 \le x \le 1$

2.1 ※ 42

Decide on intuitive grounds whether or not the indicated limit exists; evaluate the limit if it does exist.

$$f(x)=\begin{cases} 2x & , x<1 \\ x^2+1 & , x>1 \end{cases} \qquad \lim_{x\to 1} f(x) = \underline{\ 2\ }$$

(P57.) For a full limit to exist, both one-side limits have to exist and they have to equal.

$$\lim_{x\to 1^+} f(x) = \lim_{x\to 1^+} (x^2+1) = 2 \qquad \lim_{x\to 1^-} f(x) = \lim_{x\to 1^-} (2x) = 2$$

$$\lim_{x\to 1} f(x) = \lim_{x\to 1^+} f(x) = \lim_{x\to 1^-} f(x) = 2$$

2.3 ※ 16.

Evaluate the limits that exist. $\lim_{h\to 0} h\left(1-\frac{1}{h}\right) = \underline{\ -1\ }$

$$\lim_{h\to 0} h\left(1-\frac{1}{h}\right) = \lim_{h\to 0} (h-1)$$

$$= 0-1$$

$$= -1$$