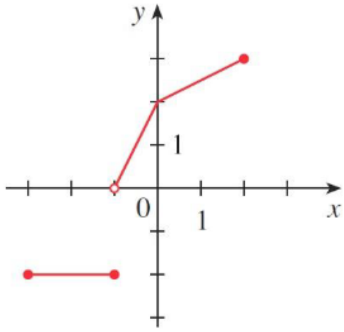
微積分(I)　　Quiz#1(2022/9/15)　系級: ____________學號: ______________姓名:_______

1. (2 points) Find an expression for this function.



$$f(x)=\begin{cases} -2, & -3<=x<=-1 \\ 2x+2, & -1<x<=0 \\ x/2+2, & 0<x<=2 \end{cases}$$

2. (2points) Find the domain of the function: $\phi(x)=\sqrt{\dfrac{x}{\pi-x}}$

$\phi(x)=\sqrt{\dfrac{x}{\pi-x}}$ is defined when $\dfrac{x}{\pi-x}\geq 0$.

(1) $x\leq 0$ and $\pi-x<0$ ($\Leftrightarrow$ $x>\pi$), which is impossible,

(2) $x\geq 0$ and $\pi-x>0$ ($\Leftrightarrow$ $x<\pi$), and so the domain is $[0,\pi)$.

3. (2 points) Find the functions $f\circ g$, $f\circ f$ and their domains.

$$f(x)=\frac{1}{x-1},\quad g(x)=\frac{x-1}{x+1}$$

$$(f\circ g)(x)=f\left(\frac{x-1}{x+1}\right)=\left(\frac{x-1}{x+1}-1\right)^{-1}=\left(\frac{-2}{x+1}\right)^{-1}=\frac{-x-1}{2},$$

domain $D=\{x\mid x\neq -1\}$.

$$(f\circ f)(x)=f\left(\frac{1}{x-1}\right)=\frac{1}{1/(x-1)-1}=\frac{x-1}{2-x},\quad D=\{x\mid x\neq 1,2\}.$$

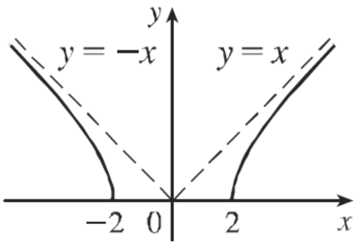
4. (2 points) Find the domain and sketch the function $h(x) = \sqrt{x^2 - 4}$

$h(x) = \sqrt{x^2 - 4}$. Now

$y = \sqrt{x^2 - 4} \quad \Rightarrow \quad y^2 = x^2 - 4 \Leftrightarrow \quad x^2 - y^2 = 4,$

the graph is the top half of a hyperbola. The domain is

$\{x \mid x^2 - 4 \geq 0\} = (-\infty, -2] \cup [2, \infty).$



5. (2 points) Starting from the graph of $y = \sqrt[3]{x}$,

Sketch the graph of (a) $y = \sqrt[3]{x+2}$

and (b) $y = \sqrt[3]{x+2}$ - 1