

Where are the following functions continuous?

$$h(x) = \sin(x^2)$$

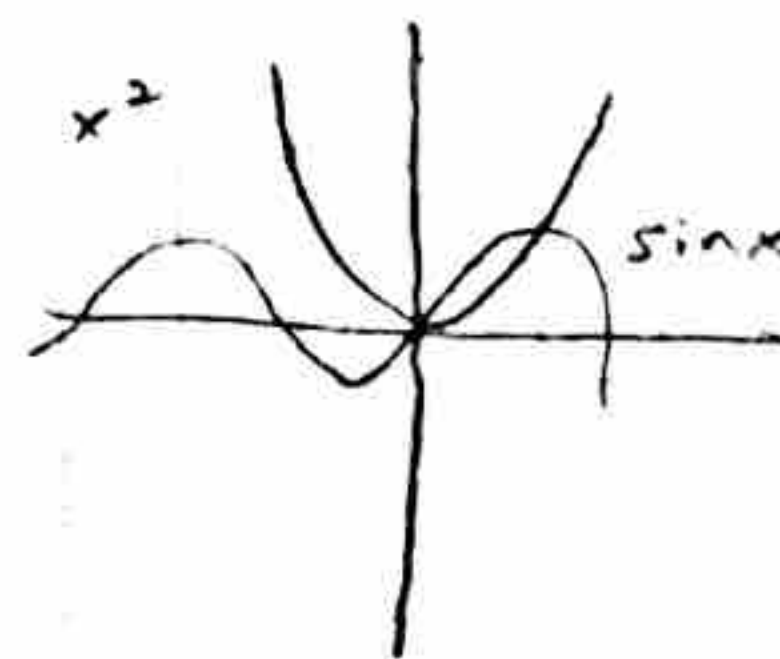
$x^2$  is continuous everywhere  
 $\sin x$  is continuous everywhere



a continuous function of a continuous function is a continuous function

$\sin(x^2)$  is continuous everywhere

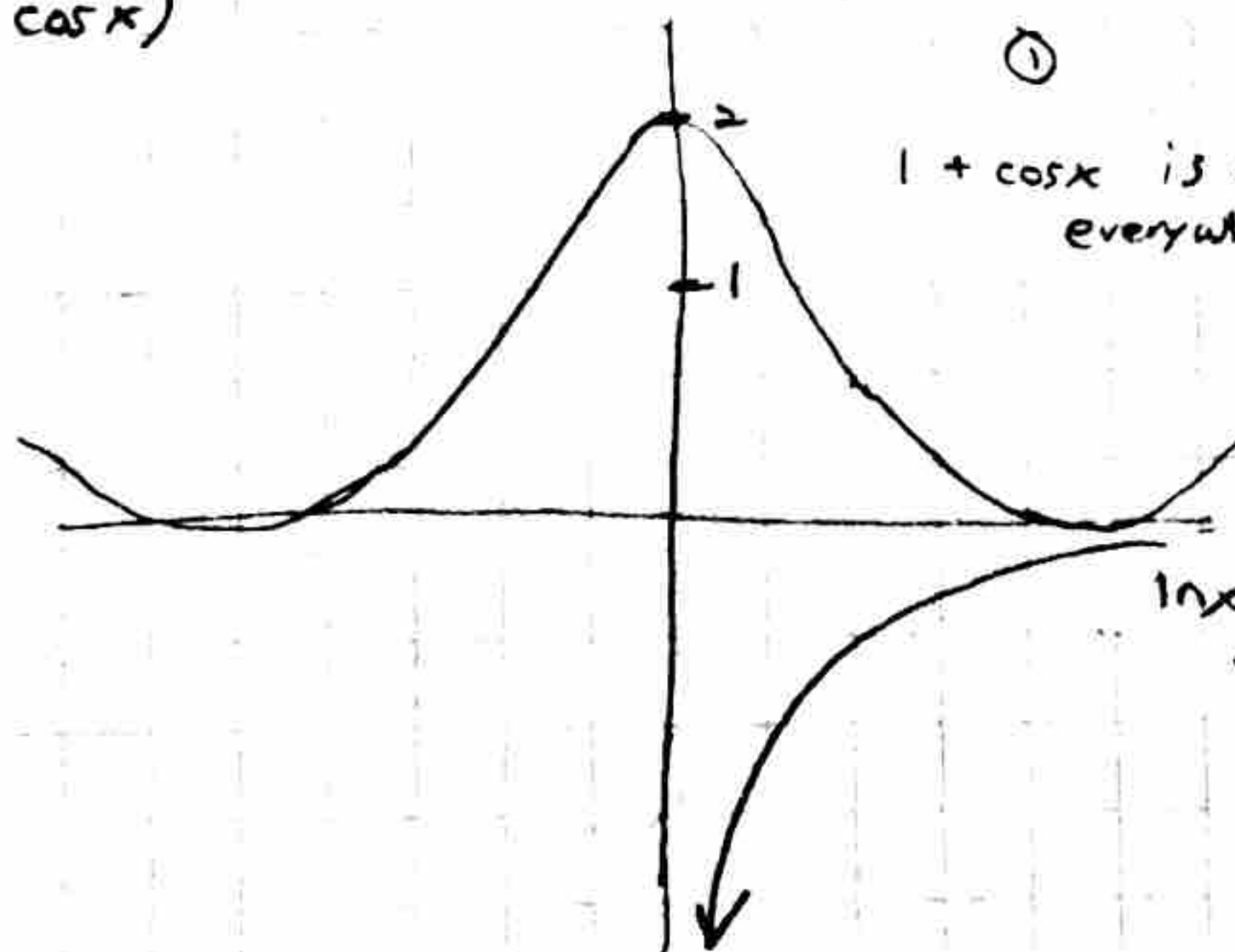
both  $x^2$  and  $\sin x$  are continuous everywhere



$$\ln(1 + \cos x)$$

$$f(x) = \ln x$$

$$g(x) = 1 + \cos x$$



①

$1 + \cos x$  is continuous everywhere

$\ln x$  is continuous at  $x > 0$

$1 + \cos x$  is continuous where  $x > 0$

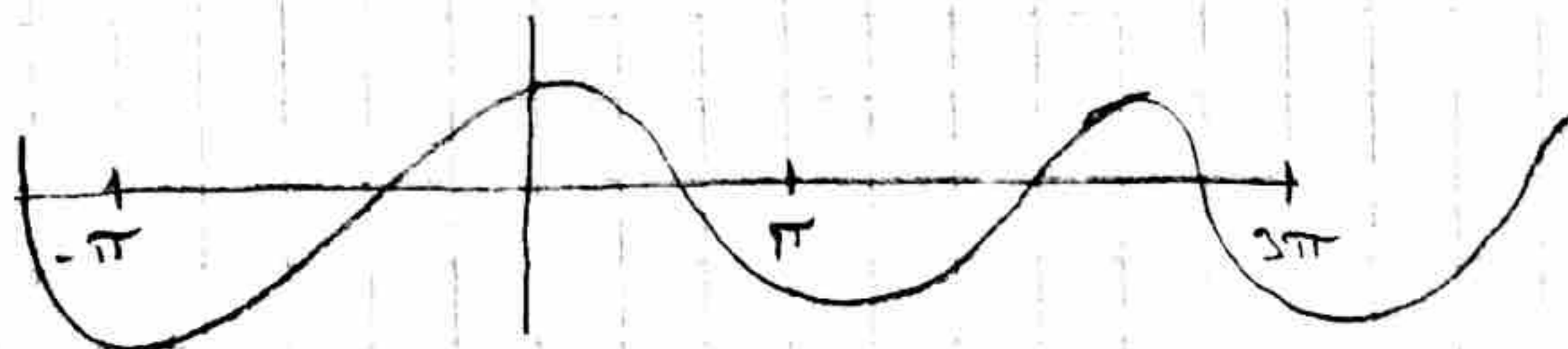
②

$$1 + \cos x > 0$$

$$\cos x > -1$$

$$\textcircled{3} \cos x = -1 = \pi$$

$f(x) = \ln(1 + \cos x)$  is continuous everywhere except at  $x = \pm\pi, \pm3\pi, \text{etc}$  at  $\pi$  intervals



Show that  $f(x) = \cos(x \sin(x))$  is continuous everywhere.

$$y = mx + b$$

$$y = 1x + 0$$

$$y = x$$

- ①  $x$  is continuous everywhere
- ②  $\sin x$  is continuous everywhere
- ③  $x \cdot \sin x$  or  $x \sin(x)$  is continuous everywhere
- ④  $\cos(x \sin(x))$  is also continuous

"a continuous function of a continuous function is also continuous"