

# Math16500 Section 24246 Quiz 2

Fall 2022, August 29

Name:

[1 pt]

**Problem 1:** Find the domain of the function

$$f(x) = \sqrt{3+x} - \sqrt{2-x}.$$

[4 pts]

**Problem 2:** Find the domain of the function

$$g(x) = \frac{\sin x}{\cos x - 1}.$$

[5 pts]

**Bonus Problem:** Find whether the following functions are odd or even or neither.

1.  $f(x) = \sqrt{2+x} - \sqrt{2-x}$
2.  $g(x) = \lfloor x \rfloor$  (the floor function)

[2 x 1 pts]

Problem 1  $f(x) = \sqrt{3+x} - \sqrt{2-x}$

$$\Rightarrow 3+x \geq 0 \text{ and } 2-x \geq 0$$

$$\Rightarrow x \geq -3 \text{ and } -x \geq -2 \Rightarrow x \leq 2$$

$$\Rightarrow -3 \leq x \leq 2, \text{ that is, } x \in [-3, 2]$$

$$\Rightarrow \text{Domain} = [-3, 2]$$

Problem 2  $g(x) = \frac{\sin x}{\cos x - 1} \Rightarrow \text{Domain of } \sin = \mathbb{R}$   
 $\text{Domain of } \cos = \mathbb{R}$

$$\Rightarrow \text{Domain of } g = (\mathbb{R} \cap \mathbb{R}) \setminus \{ \text{Points where denominator is 0} \}$$

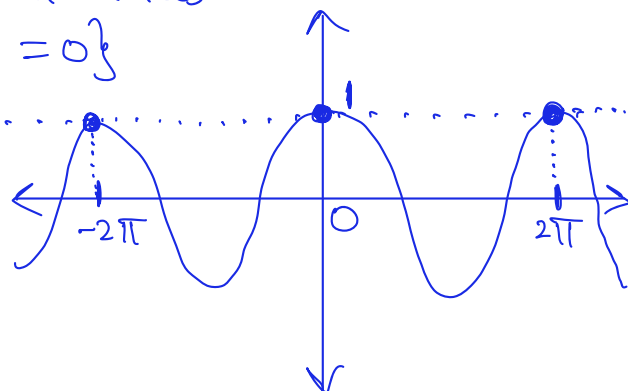
↑ set minus

$$\Rightarrow \text{Domain} = \mathbb{R} \setminus \{ x \in \mathbb{R} : \cos x - 1 = 0 \}$$

$$\cos x - 1 = 0 \Rightarrow \cos x = 1$$

$$\Rightarrow x \in \{ 0, \pm 2\pi, \pm 4\pi, \pm 6\pi, \dots \}$$

even multiples of  $\pi$



Thus, the domain is all real numbers except even multiples of  $\pi$

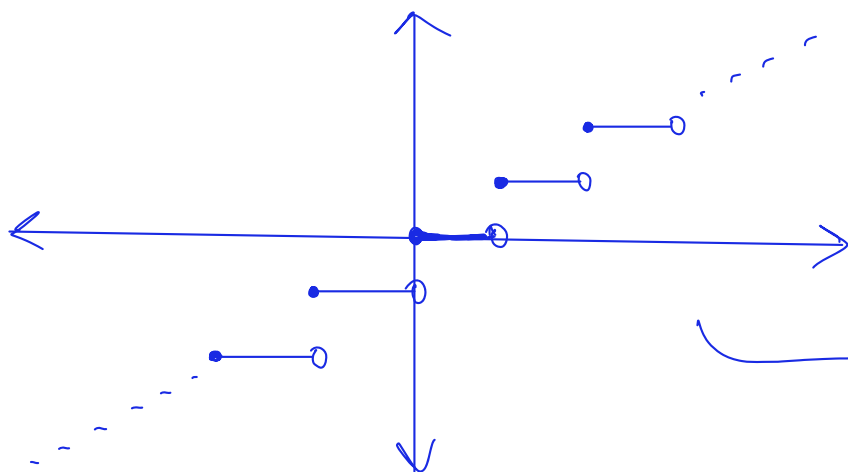
$$\text{Domain} = \mathbb{R} \setminus \{2n\pi : n \in \mathbb{Z}\}$$

### Bonus Problem

1.  $f(-x) = \sqrt{2+x} - \sqrt{2-x} = -(\sqrt{2-x} - \sqrt{2+x}) = -f(x)$   
 $\Rightarrow f$  is an odd function.

2.  $f(-x) = \lfloor -x \rfloor = -\lfloor x \rfloor - 1 \neq -f(x) \neq f(x)$   
 $\Rightarrow f$  is neither even nor odd.

we can also observe this from graph of  $y = \lfloor x \rfloor$



$\rightarrow$  definitely not symmetric about  $y$ -axis.

$\rightarrow$  Also not symmetric about origin.

had it been symmetric about the origin it's graph would have looked somewhat like

