1. Find all value(s) of $x$ in $[0, 2\pi]$ that solve

$$e^x (2 \cos x - 1) = 0$$

$$\frac{e^x}{2 \cos x - 1} = 0$$

always return positive value

$$\Rightarrow \text{for NO } x : e^x = 0$$

(\text{take ln : } x = \ln 0 \text{ undefined})

$$\Rightarrow x = \frac{\pi}{3} \quad \Rightarrow x = 2\pi - \frac{\pi}{3} = \frac{5\pi}{3}$$

2. Find the domain of the following function.

$$f(x) = \frac{x^2 + 1}{(e^x - 1) \sin x}$$

* $x^2 + 1$, $e^x - 1$ and $\sin x$ are everywhere OK

But $e^x - 1$ and $\sin x$ are sitting in the denominator and they must be nonzero. So solve $e^x - 1 = 0$ and $\sin x = 0$ and exclude those $x$'s

$$e^x - 1 = 0 \Rightarrow e^x = 1 \Rightarrow x = \ln 1 = 0 \Rightarrow \text{exclude}$$

$$\sin x = 0 \Rightarrow x = 0, \pi, 2\pi, 3\pi, 4\pi \Rightarrow x = n\pi \text{ for } n = 0, \pm 1, \pm 2, \ldots$$

also $-\pi, -2\pi, \ldots \Rightarrow \text{exclude}$

Domain: All real numbers except $x = n\pi$

$$: \mathbb{R} - \left\{ x = n\pi, n = 0, \pm 1, \pm 2, \ldots \right\}$$