MATH 190, QUIZ 1

Sept 24, 2018
Time: 15 minutes

Show all your work. No calculators, no books/notes are allowed.

Name (please print): _____

Student number: Solution

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

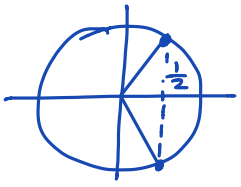
$$e^x(2\cos x - 1) = 0$$

$e^x = 0$ or $2\cos x - 1 = 0 \Rightarrow \cos x = \frac{1}{2}$ $\hookrightarrow x = \frac{\pi}{3}$, $\hookrightarrow x = 2\pi - \frac{\pi}{3} = \frac{5\pi}{3}$

e^x always return positive value

$\Rightarrow$ for NO x : $e^x = 0$

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



* reference angle $= \frac{\pi}{3}$

* positive cos $\hookrightarrow$ 1st & 4th quadrant

2. Find the domain of the following function.

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

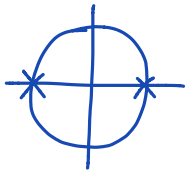
* x^2+1, $e^x - 1$ and $\sin x$ are everywhere OK

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

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

$\sin x = 0 \Rightarrow x = 0, \pi, 2\pi, 3\pi, 4\pi \Rightarrow x = n\pi$ for $n = 0, \pm 1, \pm 2, \cdots$

also $-\pi, -2\pi, \cdots$ $\hookrightarrow$ exclude



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

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