Mathematics I third credit test, version A, 12/11/28

1. Compute the limit or show it does not exist:

$$\lim_{n\to\infty} (\sin n) \cdot \left(\sqrt[3]{n+2} - \sqrt[3]{n}\right).$$

2. With given parameter $c \in \mathbb{R}$, find all solutions $x \in \mathbb{R}$ of the inequation

$$\operatorname{tg}(cx) > 0.$$

3. Which planar curve is represented by the equation

$$\frac{x^2}{4} - \frac{x}{2} + y^2 + \sqrt{3}y = 0?$$

Sketch the curve with the right parameters (coordinates of the centre, semiaxes etc.).

Results: 1. 0. **2.** $c = 0 \Rightarrow$ no such x, $c > 0 \Rightarrow x \in \bigcup_{k\in\mathbb{Z}} \left(\frac{k\pi}{c}, \frac{k\pi+\frac{\pi}{2}}{c}\right)$, $c < 0 \Rightarrow x \in \bigcup_{k\in\mathbb{Z}} \left(\frac{k\pi+\frac{\pi}{2}}{c}, \frac{k\pi}{c}\right)$. **3.** Elipse with center $\left[1, -\frac{\sqrt{3}}{2}\right]$, horizontal semiaxis 2, vertical semiaxis 1.

Mathematics I third credit test, version B, 12/11/28

1. Compute the limit or show it does not exist:

$$\lim_{n\to\infty} \left(\sqrt[3]{n} - \sqrt[3]{n-1}\right) \cdot \cos n.$$

2. With given parameter $c \in \mathbb{R}$, find all solutions $x \in \mathbb{R}$ of the inequation

$$\sin \frac{x}{c} < 0.$$

3. Which planar curve is represented by the equation

$$x^2 - x + y^2 - \sqrt{3}y = 0?$$

Sketch the curve with the right parameters (coordinates of the centre, semiaxes etc.).

Results: 1. 0. **2.** $c \neq 0$, $c > 0 \Rightarrow x \in \bigcup_{k\in\mathbb{Z}} \big((2k-1)c\pi, 2kc\pi\big)$, $c < 0 \Rightarrow x \in \bigcup_{k\in\mathbb{Z}} \big(2kc\pi, (2k-1)c\pi\big)$. **3.** Circle with center $\left[\frac{1}{2}, \frac{\sqrt{3}}{2}\right]$, radius 1.