Mathematics I, test (exampl)
WS 2016-17

1. Compute the following limit:

$$\lim_{n\to\infty} \frac{\sqrt[4]{n^4+4n}-\sqrt[3]{n^3+3n}}{\sqrt[5]{n^5+1}-\sqrt[5]{n^5+n}} \cdot \frac{1}{n^2}.$$

(15 points)

2. Compute the following limit:

$$\lim_{x\to 2}(3-x)^{\frac{1}{\sin(\pi x/2)}}$$

(15 points)

3. Find out, where f is continuous and compute derivatives or one sided derivatives at all points where these derivatives exist.

$$f(x) = \cos\sqrt[3]{(|x^2-4|-1)^2}.$$

(15 points)

4. Assume function

$$f(x) = \sin x - |\cos x|.$$

(a) Determine the intervals of monotonicity of f. Find local and global extrema.

(b) Determine the intervals where the function is convex. Find the inflection points.

(15 points)