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1 Introduction

We did examples from the 2.4 section and Quiz 4.

2 Problem 1

Excercise 3, section 2.4. Solution is on the page A89.

3 Problem 2

Excercise 5:

Sketch the graph of a function that is continuous everywhere except at $x = 3$ and is continuous from the left at 3.

Solution: one such function is given in the solution at the page A89.

4 Problem 3

Excercise 15. The graph is sketched on the page A90. The function needs to be rewritten by factoring out the nominator:

$$\frac{x^2 - x - 12}{x + 3} = \frac{(x-4)(x+3)}{x+3} = x - 4$$

See the solution to Quiz 4 for more information.

5 Problem 4

Excercise 21. Given the function $G(t) = \ln(t^4 - 1)$, find the domain, why the function is continuous at every number in its domain?

Solution: The logarithm $\ln x$ is defined only for $x > 0$. We want the logarithm to be real, e.g. $\ln(-1)$ is not defined. Otherwise, if you remember complex numbers, logarithm can be defined for any (complex) number $z = \rho e^{i\theta}$ as $\ln \rho e^{i\theta} = \ln \rho + i\theta$ and it depends on the branch cut (you can add any number of 2π to θ). Anyway, so we need to determine for which t the expression $t^4 - 1 > 0$. There are many ways to do that, for example we can factor it out: $t^4 - 1 = (t^2 + 1)(t^2 - 1) = (t^2 + 1)(t + 1)(t - 1) > 0$, but $t^2 + 1$ is always positive, so we get:

$$(t + 1)(t - 1) = t^2 - 1 > 0$$

We can either determine t from the left hand side, or just draw a graph of $t^2 - 1$, which is just a parabola shifted down by 1. In any case, we get

$$t \in (-\infty, -1) \cup (1, \infty)$$

Which is also the domain of $G(t)$.

How about the continuity? Every polynomial is continuous and $\ln x$ is continuous for all $x > 0$, so $G(t)$ which is a composition of a logarithm and a polynomial, is continuous for all t from its domain, e.g. for all $t \in (-\infty, -1) \cup (1, \infty)$.

6 Quizzes

We did Quiz 4.