

Chocolate Problem 1

September 22, 2016

Try to solve one of the two following questions:

1. Can you write a function $f(x)$ defined for all \mathbb{R} that is *not* continuous at *any* point? Justify your answer!
2. (Harder) Can you write a function defined for all \mathbb{R} that is continuous at a number p *exactly* when p is *not* rational? Justify your answer!

Suggestion (for both points): try defining $f(x)$ in a different way depending on x being rational or not, that is, try writing:

$$f(x) = \begin{cases} \text{(something)} & \text{if } x \text{ belongs to } \mathbb{Q} \\ \text{(something else)} & \text{if } x \text{ does not belong to } \mathbb{Q} \end{cases}$$