$$f(x) = \begin{cases} \frac{1}{q} & x = \frac{p}{q} \text{ in lowest terms} \\ 0 & x \text{ irrational} \end{cases}$$

$$-2 \quad -\frac{3}{2} \quad -1 \quad -\frac{1}{2} \quad 0 \quad \frac{1}{2} \quad 1 \quad \frac{3}{2} \quad 2$$