

4.3.11 (a)  $A = \mathbb{Z}$ 

As shown in the previous chapter, the step function  $s(x) = \lfloor x \rfloor$ , or the floor function has discontinuities at all points in  $\mathbb{Z}$ , and is otherwise continuous.

(b)  $A = (0, 1)$ 

Consider the function

$$f(x) = \begin{cases} \infty & \text{if } x \in (0, 1) \\ 0 & \text{if } x \notin (0, 1) \end{cases}$$

Clearly at any point in  $(0, 1)$  the function is not continuous, and any point outside it is simply the constant 0 function, which as shown previously is continuous.

(c)  $A = [0, 1]$ 

Nearly identical to the function above, simply replace the open unit interval with it's closure.

(d) Consider the function

$$f(x) = \begin{cases} \frac{1}{\lfloor x \rfloor} & \text{if } x \geq 1 \\ 0 & \text{if } x < 1 \end{cases}$$