

Exercise 2.2.16

Remember that a good way to think of \emptyset is:

$$\emptyset = \{ \}$$

Please please try this on your own first and write down your answer. Then check to see if it's right. Even if it's wrong, analyzing where you went wrong will greatly benefit you.

SPOILERS BELOW!

$$P(\emptyset) = P(\{ \}) = \{ \{ \} \} = \{ \emptyset \}$$

$$P(P(\emptyset)) = P(\{ \emptyset \}) = \{ \{ \}, \{ \emptyset \} \} = \{ \emptyset, \{ \emptyset \} \}$$

$$P(P(P(\emptyset))) = P(\{ \emptyset, \{ \emptyset \} \}) = P(\{ a, b \})$$

$$\begin{array}{c} \uparrow \quad \uparrow \\ a = \emptyset \quad b = \{ \emptyset \} \end{array}$$

$$= \{ \emptyset, \{ a \}, \{ b \}, \{ a, b \} \}$$

$$= \{ \emptyset, \{ \emptyset \}, \{ \{ \emptyset \} \}, \{ \emptyset, \{ \emptyset \} \} \}$$

$$= \{ \emptyset, \{ \emptyset \}, \{ \{ \emptyset \} \}, \{ \emptyset, \{ \emptyset \} \} \}$$

* This trick of replacing confusing/easy-to-mix-up expressions with variables is a good way to "compartmentalize your thoughts" and help you focus on the solution