(require picturing-programs)

(define a)

(define (b c d)
  (beside d (rotate 45 c)))

; QUESTION. Assume the above statement and definitions have run.
; Show each intermediate expression to produce the result of
; the following expression.
; This is the same as the expressions shown when you click the
; "Stepper" button in DrRacket.

(rotate 45 (b a))

; Functions don't look inside expressions, so rotate will have
; no idea where the 45 and the eventual image comes from.
; Don't think about rotate until all the argument expressions
; have been reduced to atomic expressions.

; Replace the variable a with its value.
(rotate 45 (b (rotate 45)))

; Evaluate (b).

; I would go back to the definition of b and draw the arrows from
; the parameter names to where they occur in the body, especially
; to notice they're used in a different order.

; The header is (b c d), so copy the body
; and replace c with (rotate 45) and d with (rotate 45).
; (rotate 45 (beside (rotate 45) (rotate 45)))

; Again, don't think about beside before all its argument expressions
; have been reduced to atomic expressions. So next is (rotate 45):

(rotate 45 (beside (rotate 45)))

; Then beside makes a single image out of the two images.

(rotate 45)

; Now rotate has a number and a single image to do its thing:
Here it is without all the explanation.
Notice that if you run this file then all the expression do in fact produce the same value.

\[
\begin{align*}
&\text{rotate 45 } (b \ a) \\
&\text{rotate 45 } (b \ \square \ \square) \\
&\text{rotate 45 } (\text{beside } \square \ (\text{rotate 45 } \square)) \\
&\text{rotate 45 } (\text{beside } \square \ \diamond) \\
&\text{rotate 45 } \square \ \diamond \\
&\square \ \\
\end{align*}
\]

For \(b \ (\text{rotate 45 } a) \ \square\), check yourself by using the Stepper, and also by making sure all your intermediate expressions produce the same value.