# Workbook:

# Rule-Based Systems

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# Learning objectives

▶ To run a trace of a RBS based on CLIPS

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- *Question 1*: Provided the following RBS in CLIPS, run a trace showing the state of Facts and Agenda using BFS strategy.

```
(deffacts data (list 4 5 3 46 12 10))

(defrule R1
  ?f <- (list $?x ?y ?z $?w)
  (test (< ?z ?y))
  =>
  (retract ?f)
  (assert (list $?x ?z ?y $?w)))
```

**Question 2**: Provided the following RBS in CLIPS, run a trace showing the state of Facts and Agenda using BFS strategy.

```
(deffacts data (list 1 2 3 4))
(defrule R1                          (defrule R2
  ?f <- (list ?x $?z) =>               ?f <- (element ?x)
  (retract ?f)                                (element ?y)
  (assert (list $?z))                 (test (< ?x ?y)) =>
  (assert (element ?x)))              (retract ?f)
                                      (assert (list-new ?x ?y)))
```

**Question 3**: Run a trace considering as an initial fact (list 1 2 2 4)

```
(deffacts data (list 1 2 2 4))
(defrule R1                        (defrule R2
  ?f <- (list ?x $?z) =>             ?f <- (element ?x)
  (retract ?f)                                (element ?y)
  (assert (list $?z))               (test (< ?x ?y)) =>
  (assert (element ?x)))            (retract ?f)
                                    (assert (list-new ?x ?y)))
```

► *Question 4*: Run a trace discarding **retract** from R1

```
(deffacts data (list 1 2 3 4))
(defrule R1                        (defrule R2
  ?f <- (list ?x $?z) =>             ?f <- (element ?x)
    (assert (list $?z))                    (element ?y)
    (assert (element ?x)))           (test (< ?x ?y)) =>
                                     (retract ?f)
                                     (assert (list-new ?x ?y)))
```

► *Question 5*: Run a trace discarding **retract** from R2

```
(deffacts data (list 1 2 3 4))
(defrule R1                        (defrule R2
  ?f <- (list ?x $?z) =>             ?f <- (element ?x)
  (retract ?f)                              (element ?y)
  (assert (list $?z))               (test (< ?x ?y)) =>
  (assert (element ?x)))            (assert (list-new ?x ?y)))
```

► *Question 6*: Provided the following RBS in CLIPS, run a trace showing the state of Facts and Agenda using BFS strategy.

```
(deffacts data (list a b c a b c c b a c b a))
(defrule R1
  ?f <- (list $?x1 ?y $?x2 ?y $?x3)
  (test (> (length $?x2) 0))
  (test (not (member ?y $?x2))) =>
  (retract ?f)
  (assert (list $?x1 ?y ?y $?x3)))
```