FINANCIAL TRADING IN R

Introduction to Signals

What Are Signals?

- Signals are the interactions of:
  - Market data with indicators
  - Indicators with other indicators
- Examples:
  - 50-day MA crossing over 200-day MA
  - Oscillator crosses under 20
- Signal is necessary (but not sufficient) for buy/sell order

Using add.signal()

- Very similar to the process for creating indicators
- Only a few signal functions

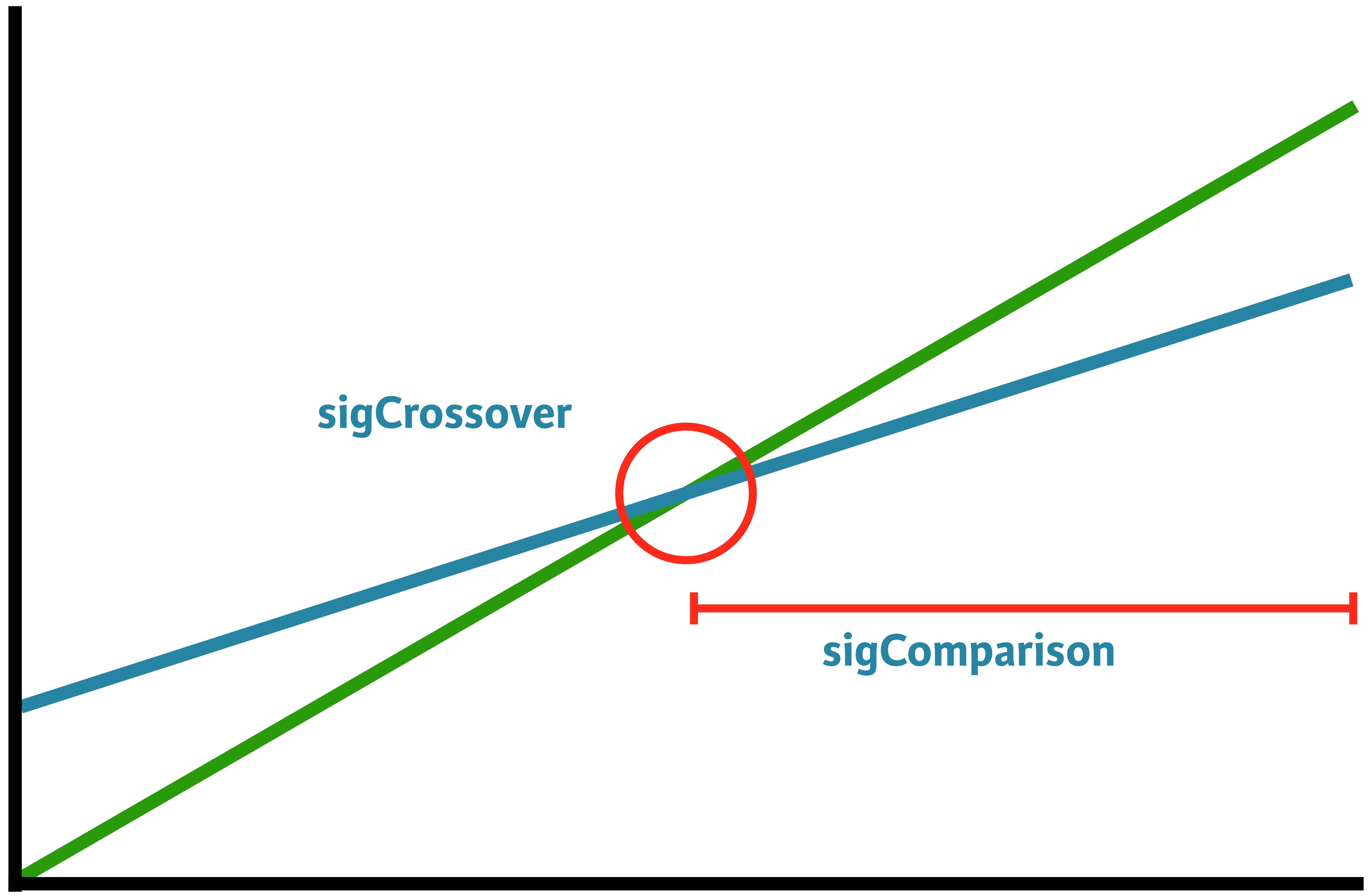
```
> add.signal(strategy.st,
             name = “function",
             arguments = list(arguments),
             label = "label")
```

- Again, similar to apply family

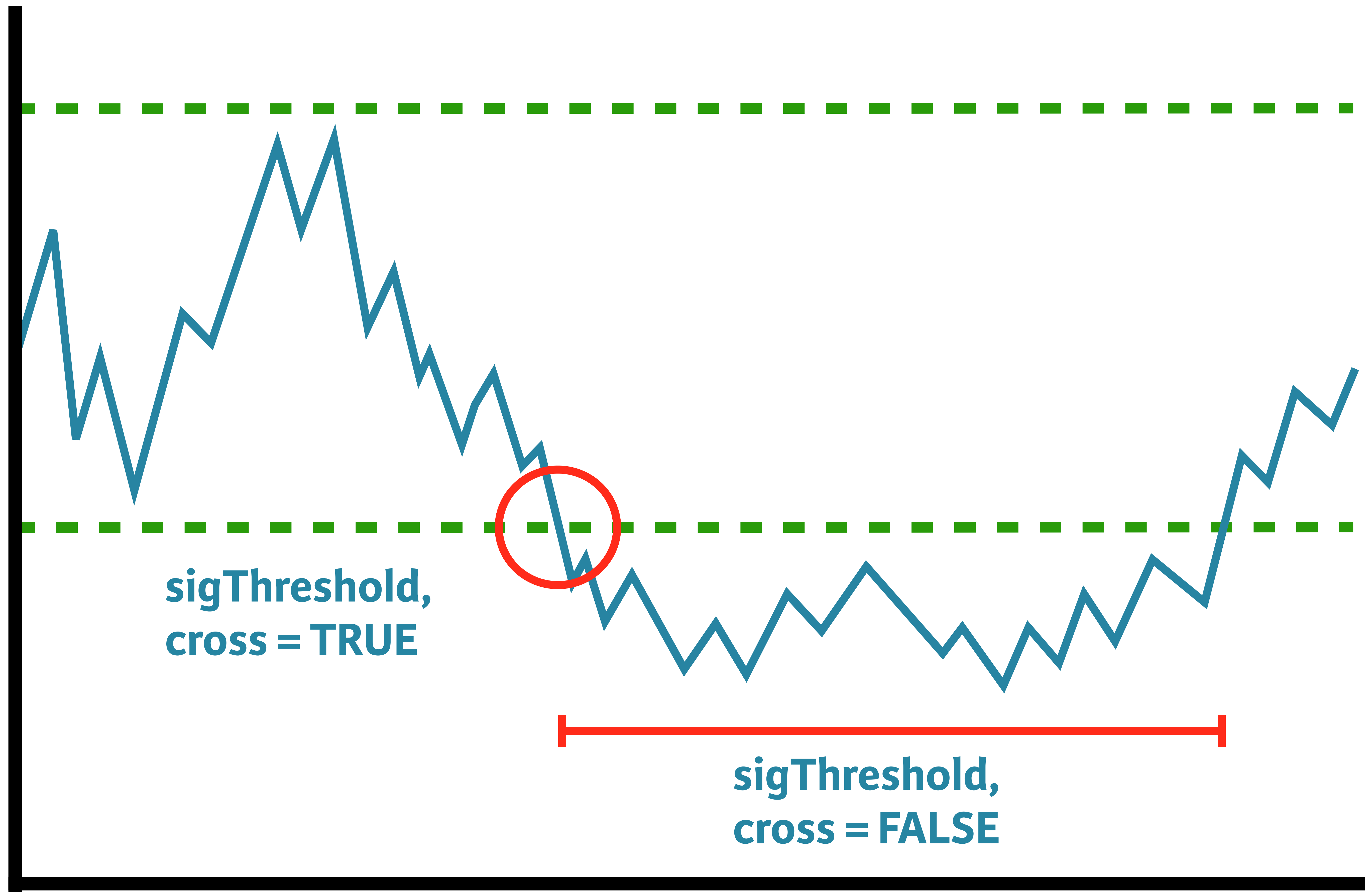
Four Types of Signals

- **sigComparison:** Relationship between two indicators, returns 1 if relationship is true
- **sigCrossover:** Similar to sigComparison, returns 1 on the first occurrence
- **sigThreshold:** Compares range-bound indicator to a static quantity
- **sigFormula:** Flexible signal function

Examples



Examples



Let’s practice!

sigComparison and sigCrossover

Trend indicators

- sigCrossover and sigComparison
- Both compare two variable quantities
- Example: shorter lookback MA crosses over longer lookback MA (50-day versus 200-day SMA)

Structure

```
> add.signal(strategy.st,
             name = "sigComparison",
             arguments = list(columns = c("str1", "str2"),
                              relationship = "lt" ),
             label = "siglabel")

> add.signal(strategy.st,
             name = "sigCrossover",
             arguments = list(columns = c( "str1", "str2"),
                              relationship = "eq"),
             label = "siglabel")
```

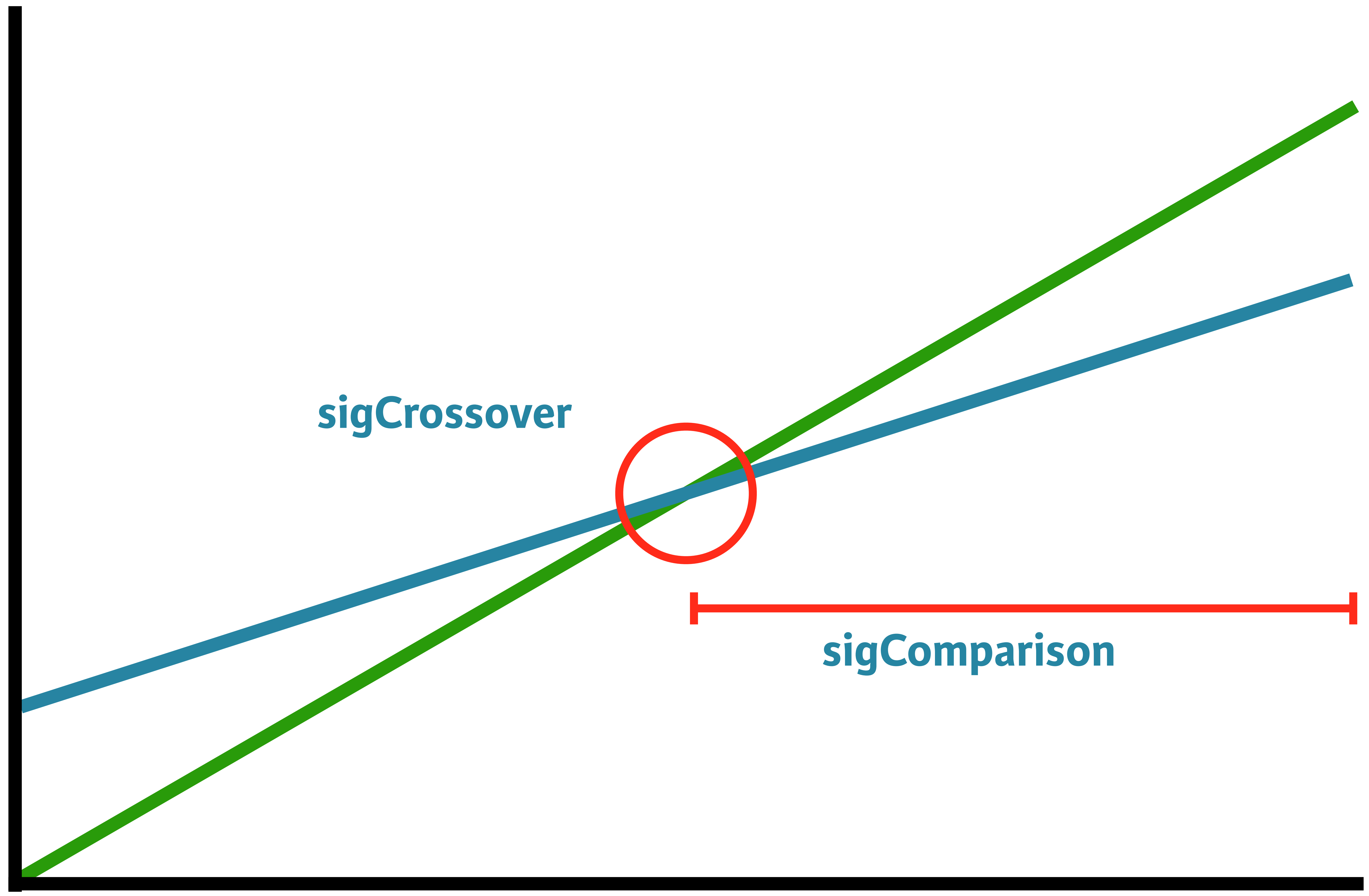
- “gt”, “lt”, “eq”, “lte”, “gte”

Structure

```
> add.signal(strategy.st,
             name = "sigCrossover",
             arguments = list(columns = c("SMA50", "SMA200"),
                         relationship = "gt"),
             label = "longfilter")
```

```
> add.signal(strategy.st,
             name = "sigComparison",
             arguments = list(columns = c("SMA50", "SMA200",
                         relationship = "lt" ),
             label = "filterexit")
```

Examples



Let's practice!

sigThreshold

About sigThreshold

- Deals with bounded indicators interacting with critical (and usually fixed) values
- Examples:
    - When the DVO crosses under 20
    - On indicator with running probability value (between 0 and 1)
    - On rolling ratio's that center on 0

Structure

```
> add.signal(strategy.st,
             name = “sigThreshold",
             arguments = list(column = "str1",
                              threshold = 20,
                              cross = TRUE,
                              relationship = "lt" ),
              label = "siglabel")
```

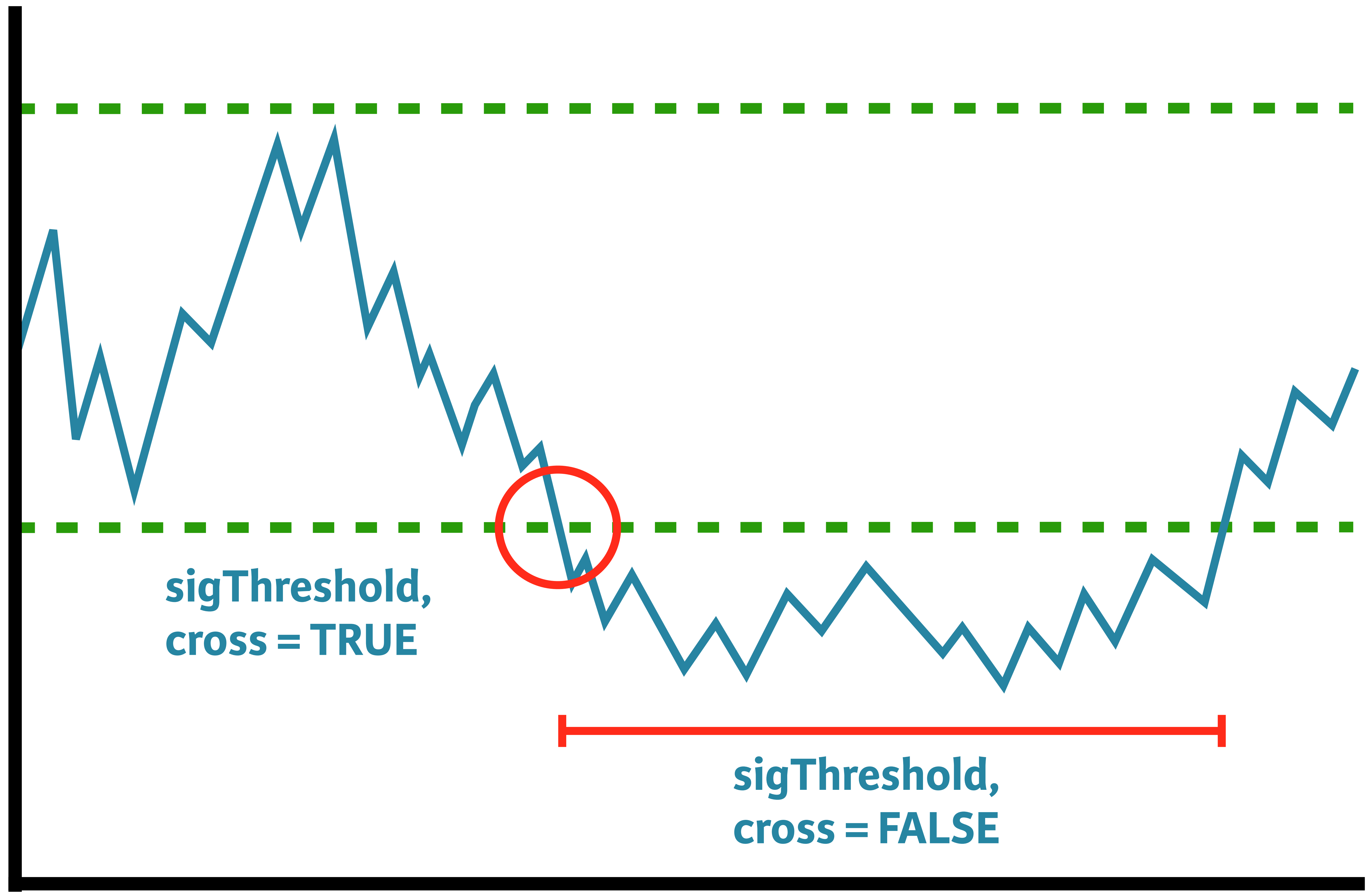
- cross = TRUE mimics sigCrossover
- cross = FALSE mimics sigComparison

Examples

```
> add.signal(strategy.st,
             name = “sigThreshold",
             arguments = list(column = "DVO_2_126",
                              threshold = 20,
                              cross = FALSE,
                              relationship = “lt"),
              label = "thresholdfilter")

> add.signal(strategy.st,
             name = “sigThreshold",
             arguments = list(column = "DVO_2_126",
                              threshold = 80,
                              cross = TRUE,
                              relationship = "gt"),
              label = "thresholdfilter")
```

Examples



Let’s practice!

sigFormula

About sigFormula

- Catch-all signal allowing for combinations of signals
- Uses string evaluation
- Example:
    - **Only** act upon oscillator signaling **if** favorable market environment (50-day SMA above 200-day SMA)
    - Make sure to buy a temporary pullback, not a large decline

Structure

```
> add.signal(strategy.st,
             name = "sigFormula",
             arguments = list(formula = "regular logical
                         statement inside an if statement",
                         cross = TRUE),
             label = "yourlabel")
```

- Base R: if(statement 1 and statement 2)

```
> add.signal(strategy.st,
             name = "sigFormula",
             arguments = list(formula = "statement1 & statement2",
                          cross = TRUE
             label = "yourlabel")
```

Example

```
> add.signal(strategy.st,
             name = “sigFormula",
             arguments = list(formula = "longthreshold &
                        longfilter", cross = TRUE),
             label = "longentry")
```

- Make sure that the columns in the logical statement are in the strategy prior to the `sigFormula` signal call

Let's practice!