Complex Conditionals in Excel
Let’s assign letter grades to students!

90 - 100 – A
80 - 89   – B
70 - 79   – C
60 - 69   – D
<60       – F
Decision Tree

grade < 60
  F
grade < 70
  grade < 80
    D
    grade < 90
      C
      B
  grade < 80
    grade < 90
      A
In Excel

=IF(grade<60,
   "F",
   IF(grade<70,
      "D",
      IF(grade<80,
         "C",
         IF(grade<90,
            "B",
            "A")
      )
   )
)
More Efficient Decomposition

- Peeling off one at a time
  Can be inefficient
  Lots of nesting
- “Balance” the tree
  Fewer decisions each path
Exercise

• Choose a number from 1 to 100

• If the number is greater than 50, STAND

• If the number is greater than 25, RAISE YOUR RIGHT HAND

  • Note that everyone standing raises their right hand

• If the number is less than 75, RAISE YOUR LEFT HAND

  • Everyone seated raises their left hand
Exercise Results

Results: 4 groups, 3 variables

- 0-25: seated, right hand raised (ignore left hand)
- 26-50: seated, right hand not raised (ignore left hand)
- 51-75: standing, left hand raised (ignore right hand)
- 76-100: standing, left hand not raised (ignore right hand)
Translate this to Excel

- If > 50
  Then select stand value
  Else select sit value
- Stand
  If < 75 then left hand
- Sit
  If > 25 then right hand

=IF(SITTING, IF(RIGHT,"<=25","25-50"), IF(LEFT,"50-75",">=75"))
Simplifying Decisions in Excel

- Create a column for each answer
- Create a column to choose the answer

Circle or Square

Circle Area

Square Area