### SETTING THE STAGE

<table>
<thead>
<tr>
<th>Essential Question</th>
<th>What is Boolean Logic?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content Objective(s) (Student-friendly)</td>
<td>Students are introduced to boolean operators and logic</td>
</tr>
<tr>
<td>Connection to previous or future lessons</td>
<td>Students use R, along with the statistical concepts introduced in previous classes.</td>
</tr>
<tr>
<td>Critical Thinking Questions</td>
<td>How can and or statements be used to help R make decisions?</td>
</tr>
<tr>
<td>Key Vocabulary</td>
<td>Boolean, AND, OR, NOT, XOR</td>
</tr>
<tr>
<td>Materials Needed/Safety</td>
<td>Computer, R Studio</td>
</tr>
</tbody>
</table>

### ACTIVE INSTRUCTION

| Launch (Engage) | Boolean operators can be used to help a program make decisions. |
| Investigation (Explore) | Students are introduced to truth tables for various boolean operations before actually beginning to explore how R handles these same operations. Students then write a primitive if statement. |

### TIME FOR REFLECTION

| Summarization (Explain & Extend) | Students gain an insight to how an actual program can make decisions based on boolean logic. |
| Homework | None |
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```r
# Boolean
test1 <-c(1,2,3,4,5,6,7,8,9,10)
bin1 <-c(1,1,1,1,0,0,0,0,0)
bin2 <-c(1,0,1,0,1,0,1,0,1,0)
log1<-c(T,T,T,F,F,F,F,F)
log2<-c(T,F,T,F,F,T,F,F)

test1 <= 5
test1 < 5
test1 >5

log1&log2
log1|log2
!log1
!log1&log2
log1&!log2
xor(log1,log2)

test1 <=5 & test1 >2

k<- 0
for (i in 1:10)
{
  k <- k+1
}
m<-0
for (i in 1:10){
  for (i in 1:10){
    m<- m+1
  }
}
n <- 0
#Bringing it all together
for(i in 1:100){
  if(i >= 20 & i <= 30){
    n <- n+2
  }else{
    n <- n+1
  }
}
```