8 Rules for Chart Interpretation

- Test 1: Extreme points
- Test 2: 2 out of 3 points in zone A or beyond
- Test 3: 4 out of 5 points in zone B or beyond
- Test 4: Runs above / below the centerline
- Test 5: Linear trend
- Test 6: Oscillatory trend
- Test 7: Avoidance of zone C
- Test 8: Run in zone C
Remember: No zones on the R chart
Test 1 examples - Extreme Points

\[ \alpha/2 = 0.00135 \]
Test 2: 2 out of 3 Points in Zone A or Beyond
Basis for Test 2

Prob (A Point in Zone A or Beyond) = .0227

Prob (Two Points in a Row in Zone A or Beyond)
= (0.0227) * (0.0227) = 0.00052

Very small relative to $\alpha/2 = 0.00135$
-- 2 points in a row in zone A is too restrictive

What about 2 out 3 in zone A or beyond? Two ways for this to occur: (A -- not A -- A) OR (not A -- A -- A)
= 2 * (0.0227)^2 * (0.9773) = 0.0010 -- close to $\alpha/2$
Test 2 examples - 2 out of 3 Points in Zone A or Beyond
Additional Comments on Test 2
Test 3 examples - 4 out of 5 Points in Zone B or Beyond
Test 4 examples - Runs Above or Below the Centerline

Probability Above / Below CL = 0.5

Prob (8 in a row above) = (0.5)^8 = 0.0039

FYI... (0.5)^9 = 0.00195 \quad (0.5)^{10} = 0.000977
Test 5 examples - Linear (Upward / Downward) Trend
Test 6 examples - Oscillatory Trend
Test 7 examples - Avoiding Zone C

Prob (one point outside zone C) = 1 - 0.68 = 0.32

\((0.32)^8 = 0.00011\) -- very small
Test 8 examples - Run in Zone C

Prob (being in zone C) = 0.68

Prob (15 in a row in zone C) = (0.68)^15 = 0.0031
Example - Simultaneous Application of More Than One Test for Out-of-Control Conditions