Marbles

10 blue, 10 red marbles in a bag
Draw 2 out at a time, 50 times

Observed 13 RR, 20 RB/BR, 17 BB

RR: \( P(RR) = \frac{9}{38} \)

1R, 1B: \( P(RB \text{ or } BR) = \frac{20}{38} \)

BB: \( P(BB) = \frac{9}{38} \)

Expected values: 12 RR, 26 RB/BR, 12 BB

Chi-square = \( \frac{1}{12} + \frac{36}{26} + \frac{25}{12} = 3.55 \)
Normal Distribution

Properties
- Centered at mean, median, mode
- Symmetric
- +/- standard deviations
- Notation \(\sim N(\mu, \sigma^2)\)

Standard normal distribution
\(\mu = 0, \sigma^2 = 1\)

\[ z = \frac{x - \mu}{\sigma_x} \]

\[ x = z(\sigma_x) + \mu \]
SAT scores

SAT math is ~N(475,1000)

- Compute a z-score for Luke who scored a 650
- Richard’s z-score is a -1.2, what is his raw score?
- Alfred scores a 420 on the math SAT, what is Alfred’s percentile?
- Julie is in the 80th percentile for the math SAT, what was her raw SAT score?
- What is the probability that a random student will score between a 500 and a 700 on the math SAT?