the normal distribution

- normal distribution = gaussian distribution = bell curve
  - just two parameters: mean and standard deviation (or variance)
  - symmetric, unimodal, asymptotic
  - mean = median = mode
  - common distribution; central limit theorem; galton box videos

- normal distribution is a theoretical distribution; used in inferential statistics
- proportion between standard deviations (figure 4.5)
  - proportions: 34.13%, 13.59%, 2.15%
  - can find proportion of samples within a certain range
  - e.g., mean temperature 37 ºC, standard deviation 0.5 ºC
    population has 68% between 37.0 - 0.5 = 36.5 and 37.0 + 0.5 = 37.5

- z score = standard score
    z = (x - mu) / sigma, or z = (x - xbar) / s
  - number of standard deviations above or below the mean
  - indicates how large a score is relative to the population
    - e.g., z score of body temperature 38 ºC: (38-37)/0.5 = 2
    - e.g., z score of mean is zero
  - opposite direction: z score to raw score
    x = mu + z × sigma, or x = xbar + z × s
    - e.g., z score -3 occurs at: x = 37 + (-3) × 0.5 = 35.5 ºC

- percentile score
  - point that is just greater than p% of the population
  - urdan, appendix A
    - table gives area under standard normal distribution to left of z (z >= 0)
    - can also use table to find proportion to the right of z
    - can also use table for negative z values
  - opposite direction: look up z value for a given percentile score
  - kelley, reference table 1; equals urdan's table minus 0.5

- so far we can
  - convert raw score to z score, and vice versa
  - convert z score to percentile (or proportion), and vice versa

- can also combine the above, e.g., convert raw score to percentile
  - e.g., what proportion of people have body temperature below 38.2 ºC?
    z = (38.2 - 37.0) / 0.5 = 2.4, p = 0.9918

- can also find proportion of distribution between two z scores or two raw scores
  - what proportion of people have body temperature between 36 ºC and 38 ºC?