Today: Normal Curve, Experimental Design  
Read: DD ch. 6  
Wed: Experimental Design, Sampling  
FPP. ch. 19. (22)  
optional

From now on: meet TAs for office hours not at BE 142 but at Baskin White Boards near BE 126 - DO NOT KNOCK DOOR @ BE 142

Paid Note-Takers: Minh Nguyen  
Jordan Pryidal  
Casey Winheim

Look at Case Study 3

CS 3 cont. (reader p.33)  
Standard Deviation = 2.5 in  
\[ \frac{100\% - 95\%}{2} = 2.5\% \]  
Approximate answer  
Exact = 2.47%  
Approx: good (C-)b

[Diagram: Normal distribution curve with standard deviation marked]

raw units axis (in)  
54.5 in  57.5 in  72 in

Standard units axis (SU)  
-2 -1 0 1 2

Each unit = 1 standard deviation  
\[ \text{SU} = \frac{\text{number} - \text{mean}}{\text{SD}} \]

\[ z = \frac{y - \mu}{\sigma} \Rightarrow \text{Convert to SU} \]

Look at Case Study 4

Experimental Design:  
Get a bunch of people (1)  
Give them all (2)  
Wait a while (3)  
See how many get AIDS

1 How many? More seems better than less, but possible to have too many people in a study: (a) cost, (b) identify accuracy goal more than that is too many

2 How much? Possible to have too little (no effect), or too much (adverse side effects that out-weight benefits)

4 Dose-response studies in lab animals (\( \times \) ng iso)
How long? Possible for experiment to be too short (no effect).
Also possible to be too long (if study shows treatment is effective or not, unethical to continue trial.

Who? HIV positive people; good to get people worldwide b/c of generalizability, but this costs too much.
(HIV positive people in Denmark & Sweden & people who consent to be part of experiment)

Determining sample size (later) \( n = 833 \) in case study 4.

Design 1: Get 833 HIV positive people in Denmark & Sweden who agree to participate, give them all \( xx \) mg iso, wait 12 weeks, see how many get AIDS (19 out of 833)

Terrible Design: No comparison between iso vs. no iso

Solution: Run experiment in 2 groups
Iso = treatment \( \Rightarrow \) give \( xx \) mg iso (blue pill) \( T \)
No Iso = control \( \Rightarrow \) give a placebo (same blue pill w/o 120) \( C \)

Placebo effect: people sometimes respond to idea of having iso rather than iso itself (psychological effect)

Design 2: Get 833 people, give \( 1/2 \) to about \( 1/2 \) of them \( T \) and give placebo to other \( 1/2 \), wait 12 weeks, see how many get AIDS
\[ T = \frac{2}{42} = 0.8\% \]
\[ C = \frac{17}{42} = 4.0\% \]

Is this difference (0.8% vs. 4.0%) large in practical terms?
A: Huge 4.0% : 8 to 1 ratio! 0.8%

Principle: We want \( T \) & \( C \) people to be as similar as possible in all relevant ways except for \( T \) & \( C \) distinction (Fisher)

Solution: Random assignment.