The Geometry of the Normal Distribution

Before we rely on R to handle complex probability calculations, we must master the "ruler" of the Normal distribution. The Empirical Rule allows us to estimate probabilities geometrically by looking at the standard deviations (σ) from the mean (μ). **Scan to visualize the Empirical Rule.** It is recommended to hold your smartphone in landscape mode and to minimize the code by tapping on this: <<

Bill the Statypus says: This worksheet is a "No-Code" zone. Put the computer away. Use the Desmos tool or your knowledge of the Empirical Rule to estimate these probabilities. If you find yourself typing `pnorm()`, you are bypassing the geometric intuition we are trying to build!

Sally the Statypus says: BIll! Slow down. We haven't even taught them the Empirical Rule! Ok... head to section 7.6 in your book and look at Theorem 7.3 and then come back here and try the problems. Notice that the model you got via the QR Code is sitting right there in your textbook!

Estimations

Part 1: Atmospheric Pressure

Atmospheric pressure at a specific high-altitude weather station is modeled by $\text{Norm}(600, 10)$ in millibars.

1. Estimate the probability that a random pressure reading is between 590 and 610 millibars.

2. Estimate the probability that a reading is greater than 630 millibars.

3. Estimate the probability that a reading is between 580 and 620 millibars.

Part 2: Platypus Tail Length

The tail length of adult male platypuses in a specific region is modeled by $\text{Norm}(14, 2)$ in centimeters.

4. Estimate the probability that a random platypus has a tail length between 12 cm and 16 cm.

5. Estimate the probability that a random platypus has a tail longer than 18 cm.

6. Estimate the probability that a random platypus has a tail length between 10 cm and 18 cm.

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