The Blue Shadow

Inference for an Individual Response

In our previous analysis, we focused on the "Red Shiver"—the range where we expect the true average birth weight to live. However, most parents aren't interested in the aggregate data; they are interested in *their* specific baby. To see how our uncertainty changes for single cases, we need to view the full dual-interval plot.

Coding Corner: The Dual Interval Plot

```
# Initialize the environment and generate the final visualization
load(url("https://statypus.org/files/StatypusCh12.RData"))
RegressionInference(BabyData1$gestation, BabyData1$weight)
```

1. The Individual Chaos

Refer back to the mathematical blueprints you transcribed at the start of this lab. While the formulas look nearly identical, the "Individual" formula includes a $+1$ inside the square root that the "Mean" formula lacks. This extra term represents the inherent variation of a single data point.

Statypus Insight: The Scale of Uncertainty

The **red bands** represent the Confidence Interval (Mean), and the wider **blue bands** represent the Prediction Interval (Individual).

- Which interval is significantly wider at 38 weeks gestation?

- In your own words, why does predicting the outcome of *one specific case* require a much larger "Safety Net" than estimating the overall baseline of a population?

2. Choosing and Translating Your Tool

Coding Corner: Generating the Intervals

Run the following code to find the numerical bounds for a 39-week gestation period ($x_0 = 39$):

```
RegressionInference(BabyData1$gestation, BabyData1$weight, x0 = 39)
```

In practice, using the wrong interval can lead to a dangerous false sense of security or wildly inefficient planning. For each scenario, circle the correct tool, record the numerical interval from your R output, and **explain what those specific numbers mean.**

1. **Scenario A:** A hospital pharmacy is budgeting for their monthly order of a highly perishable, weight-based prophylactic medication given to all newborns at 39 weeks gestation. To ensure they have enough total liquid volume for the 500 expected deliveries without overspending on stock that will expire, which interval should they use to calculate their baseline needs?

   Circle One: Confidence Interval **OR** Prediction Interval

   Calculated Interval: [_____ , _____]
   In words, we are 95% confident that...

2. **Scenario B:** A maternity ward charge nurse is setting up a delivery room for an incoming patient at 39 weeks. Because they do not know exactly who is coming through the doors, they need to ensure the room is stocked with a sufficient array of correctly sized neonatal CPAP masks (breathing support). Which interval best represents the range of weights they must be physically prepared to accommodate right now?

   Circle One: Confidence Interval **OR** Prediction Interval

   Calculated Interval: [_____ , _____]
   In words, we are 95% confident that...