

Bayesian Statistics, Assignment for Friday, Aug. 30

From *The Statistical Treatment of Experimental Data*

Copy Units I and II (Chapters 1-5) of Hugh Young, *The Statistical Treatment of Experimental Data*.

Study through p. 15.

For Problem Set 1

Turn to p. 19 of *The Statistical Treatment of Experimental Data*

1. Problem 3 on p. 19
2. Problem 4 on p. 19
3. Do Problem 5 on p. 19, using the approximate formula for $\frac{\Delta V}{V}$ given in Eq. 2.5 on p. 6. Note that $\Delta h = 0$ because only the piston diameter has been increased, not its stroke length.
4. Repeat Problem 5 on p. 19, but using the exact formula,

$$\frac{\Delta V}{V} = \frac{\pi (r+\Delta r)^2 h - \pi r^2 h}{\pi r^2 h} = \frac{(r+\Delta r)^2 - r^2}{r^2} = \left(1 + \frac{\Delta r}{r}\right)^2 - 1$$

Think about why the two answers for 3 and 4 are nearly the same.

5. Problem 6 on p. 19. First derive the approximate formula for $\frac{\Delta W}{W}$, where W is the weight and $W = l w$ where l is the length of the paper and w is its width. You will need to go back to p. 5 and review how the approximate formula for $\frac{\Delta V}{V}$ given in Eq. 2.5 was derived.
6. Repeat Problem 6 on p. 19, but using the exact formula,

$$\frac{\Delta W}{W} = \frac{(l+\Delta l)(w+\Delta w) - l w}{l w} = \left(1 + \frac{\Delta l}{l}\right)\left(1 + \frac{\Delta w}{w}\right) - 1$$

Think about why the two answers for 5 and 6 are nearly the same.