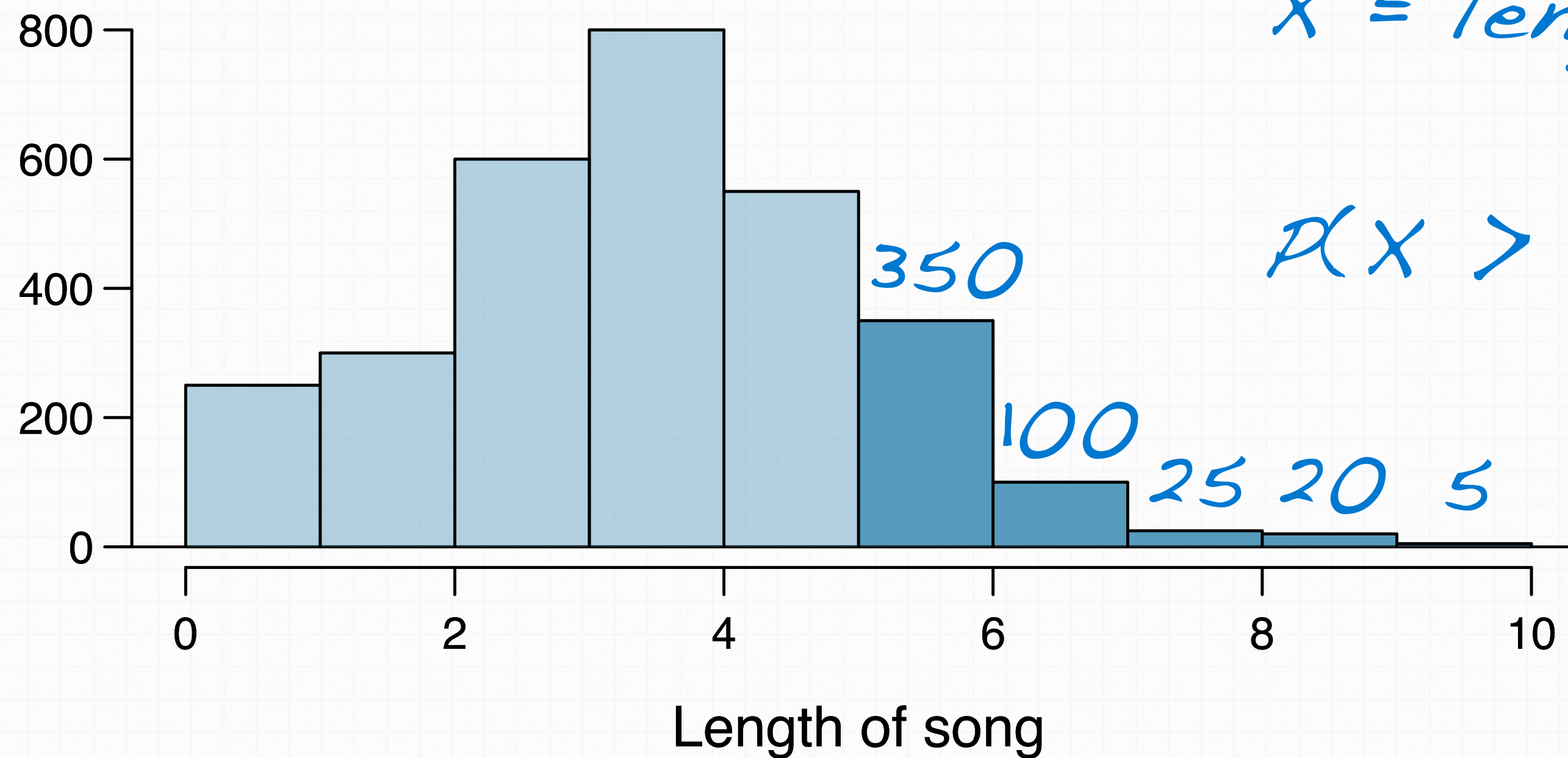


examples

central limit
theorem
(for means)

Suppose my iPod has 3,000 songs. The histogram below shows the distribution of the lengths of these songs. We also know that, for this iPod, the mean length is 3.45 minutes and the standard deviation is 1.63 minutes. Calculate the probability that a randomly selected song lasts more than 5 minutes.



$X = \text{length of one song}$

$$P(X > 5) = \frac{350 + 100 + 25 + 20 + 5}{3000}$$

$$= 500 / 3000$$

$$\approx 0.17$$

I'm about to take a trip to visit my parents and the drive is 6 hours. I make a random playlist of 100 songs. What is the probability that my playlist lasts the entire drive?

$$6 \text{ hours} = 360 \text{ minutes}$$

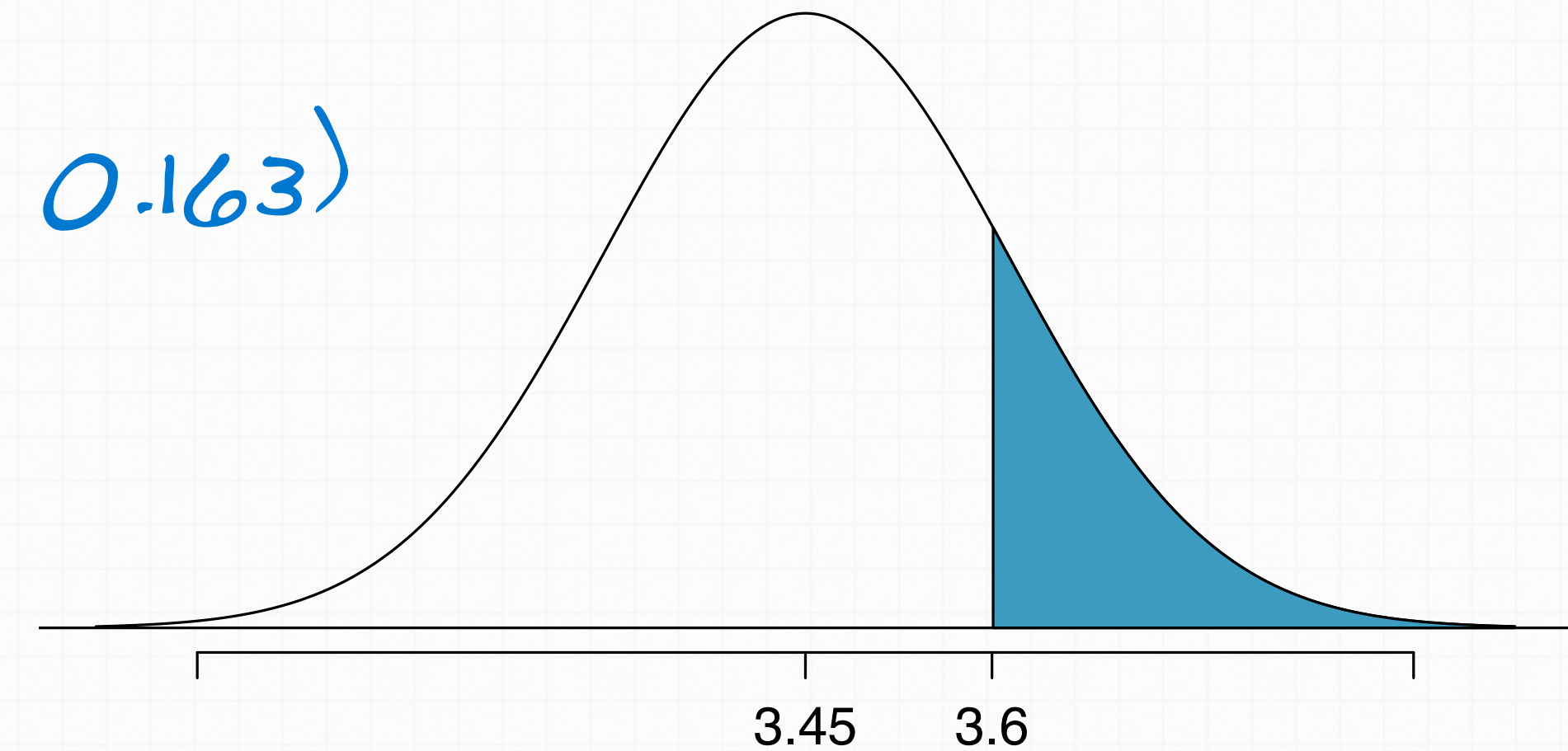
$$P(X_1 + X_2 + \dots + X_{100} > 360 \text{ min}) = ?$$

$$P(\bar{X} > 3.6) = ?$$

$$\bar{X} \sim N(\text{mean} = \mu = 3.45, SE = \frac{\sigma}{\sqrt{n}} = \frac{1.63}{\sqrt{100}} = 0.163)$$

$$Z = \frac{3.6 - 3.45}{0.163} = 0.92$$

$$P(Z > 0.92) = 0.179$$



Four plots: Determine which plot (A, B, or C) is which.

- (1) The distribution for a population ($\mu = 10$, $\sigma = 7$),
- (2) a single random sample of 100 observations from this population,
- (3) a distribution of 100 sample means from random samples with size 7, and
- (4) a distribution of 100 sample means from random samples with size 49.

