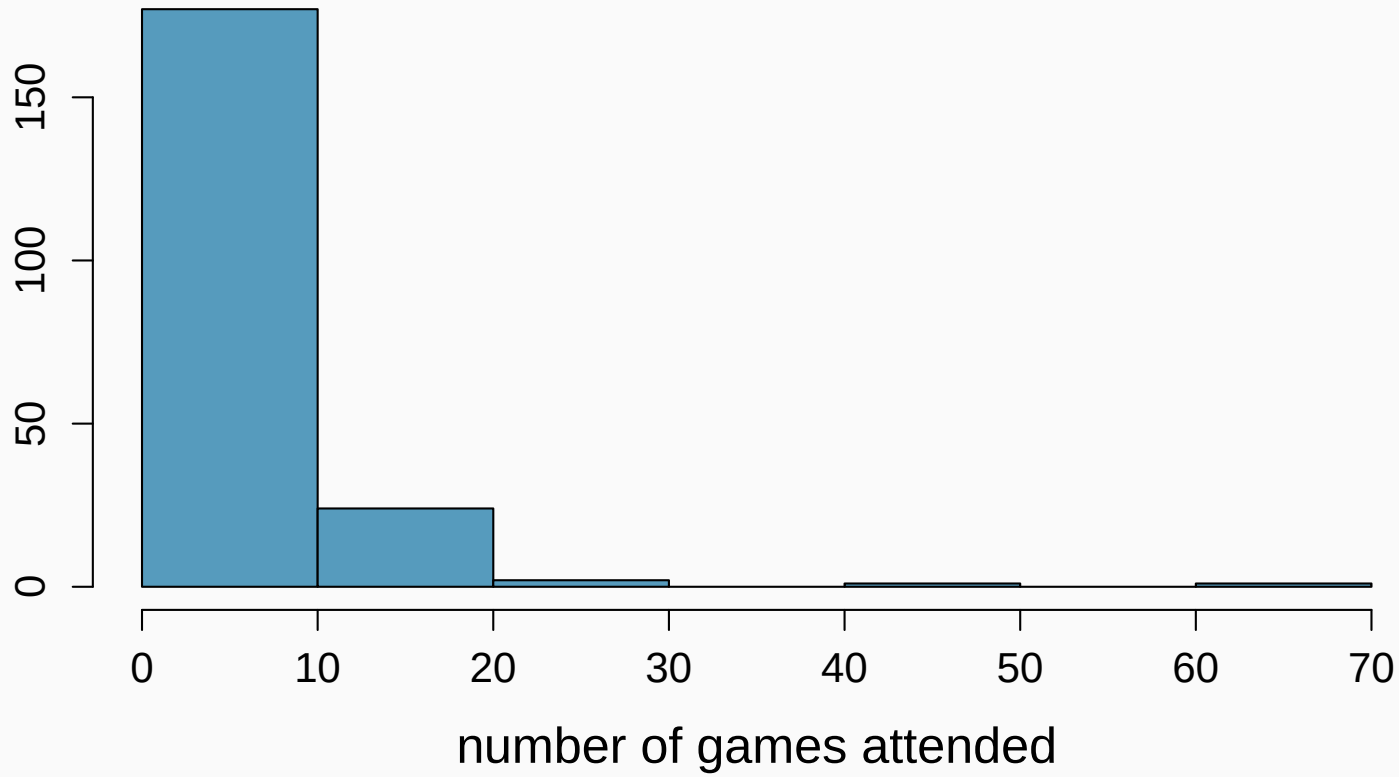
Examining the Central Limit Theorem

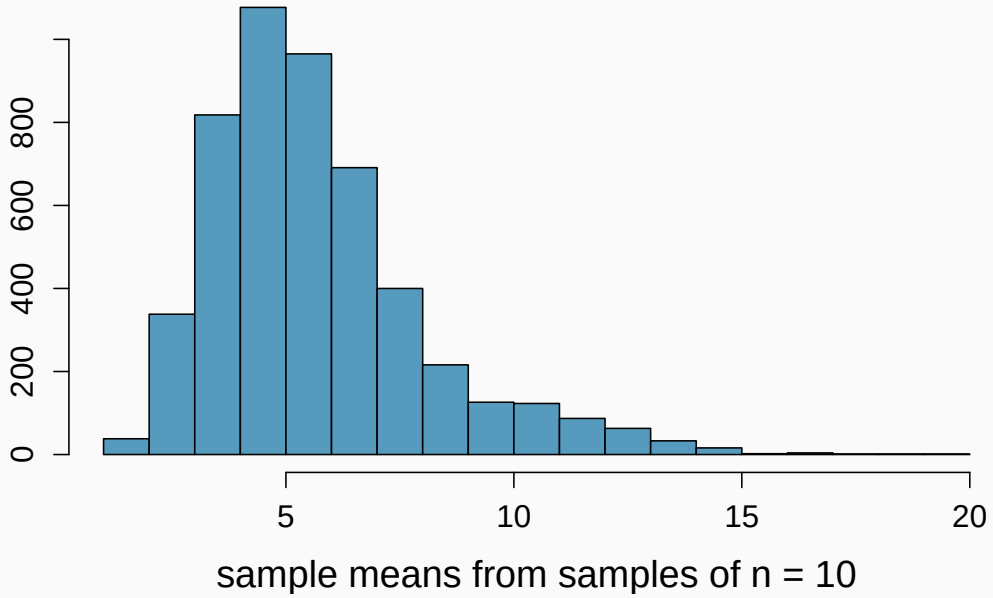
Average number of basketball games attended

Next let's look at the population data for the number of basketball games attended:



Average number of basketball games attended (cont.)

Sampling distribution, n = 10:



What does each observation in this distribution represent?

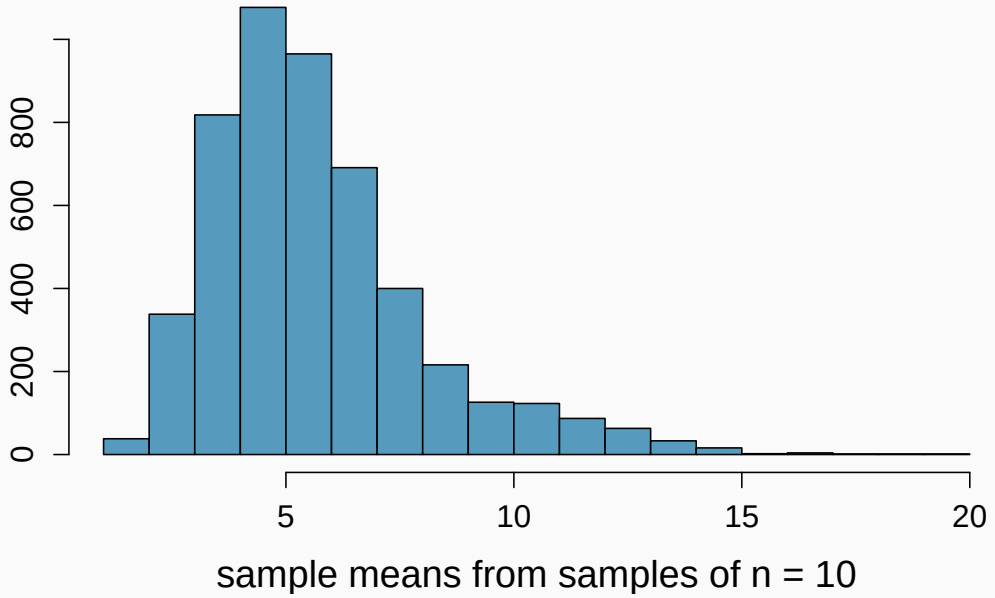
Sample mean ($\bar{x}$) of samples of size $n = 10$.

Is the variability of the sampling distribution smaller or larger than the variability of the population distribution? Why?

Smaller, sample means will vary less than individual observations.

Average number of basketball games attended (cont.)

Sampling distribution, n = 10:



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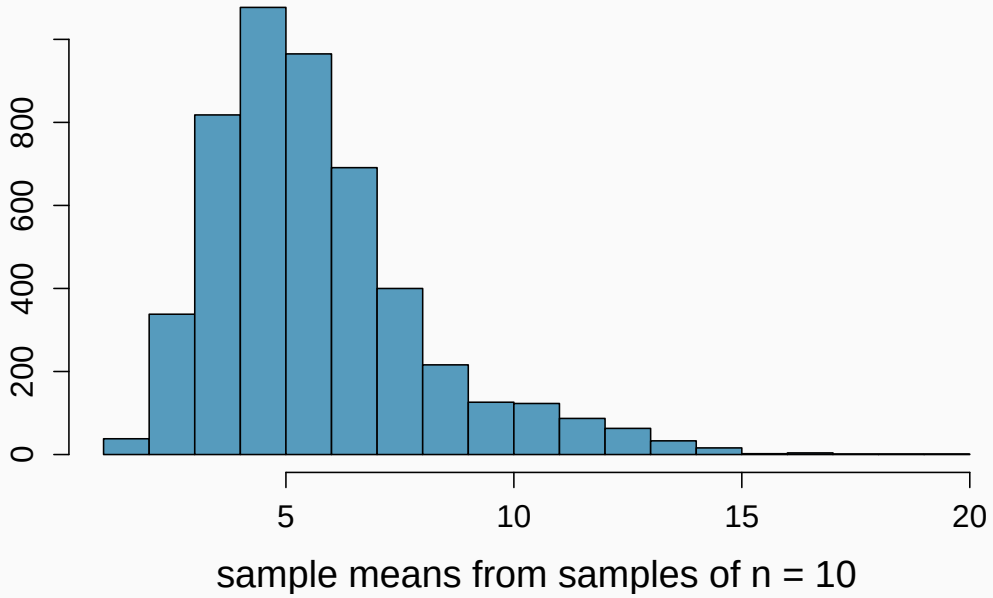

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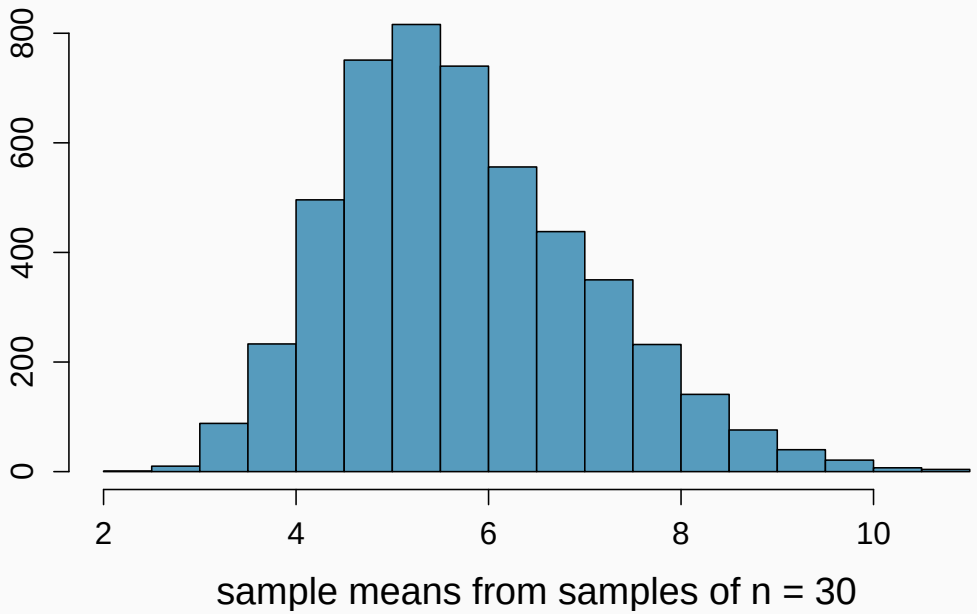
Average number of basketball games attended (cont.)

Sampling distribution, n = 30:

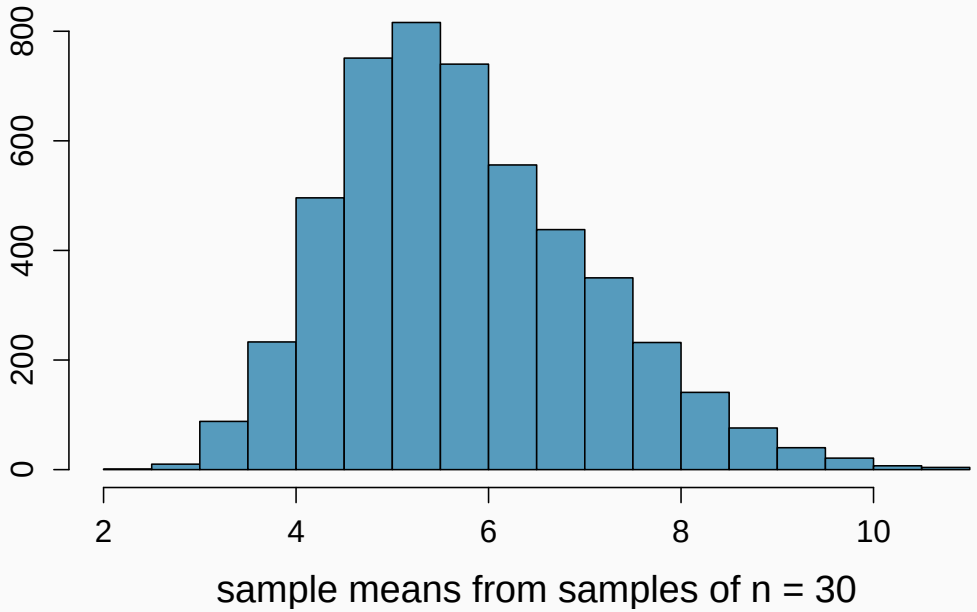


How did the shape, center, and spread of the sampling distribution change going from $n = 10$ to $n = 30$?

Shape is more symmetric, center is about the same, spread is smaller.

Average number of basketball games attended (cont.)

Sampling distribution, n = 30:

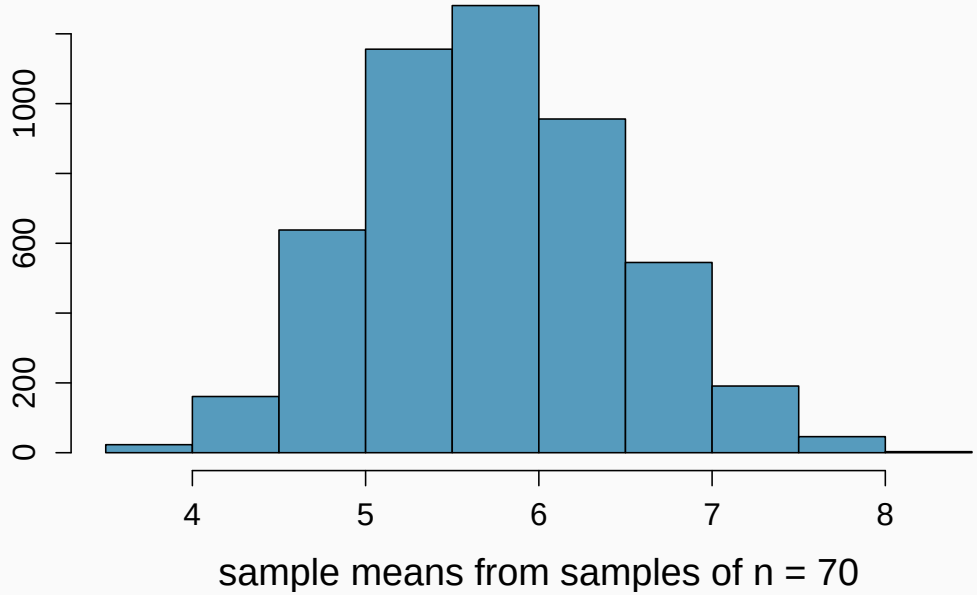


How did the shape, center, and spread of the sampling distribution change going from $n = 10$ to $n = 30$?

Shape is more symmetric, center is about the same, spread is smaller.

Average number of basketball games attended (cont.)

Sampling distribution, n = 70:



Average number of basketball games attended (cont.)

The mean of the sampling distribution is 5.75, and the standard deviation of the sampling distribution (also called the *standard error*) is 0.75. Which of the following is the most reasonable guess for the 95% confidence interval for the true average number of basketball games attended by students?

(a) 5.75 ± 0.75

(b) $5.75 \pm 2 \times 0.75$

(c) $5.75 \pm 3 \times 0.75$

(d) cannot tell from the information given

Average number of basketball games attended (cont.)

The mean of the sampling distribution is 5.75, and the standard deviation of the sampling distribution (also called the *standard error*) is 0.75. Which of the following is the most reasonable guess for the 95% confidence interval for the true average number of basketball games attended by students?

(a) 5.75 ± 0.75

(b) $5.75 \pm 2 \times 0.75 \rightarrow (4.25, 7.25)$

(c) $5.75 \pm 3 \times 0.75$

(d) cannot tell from the information given

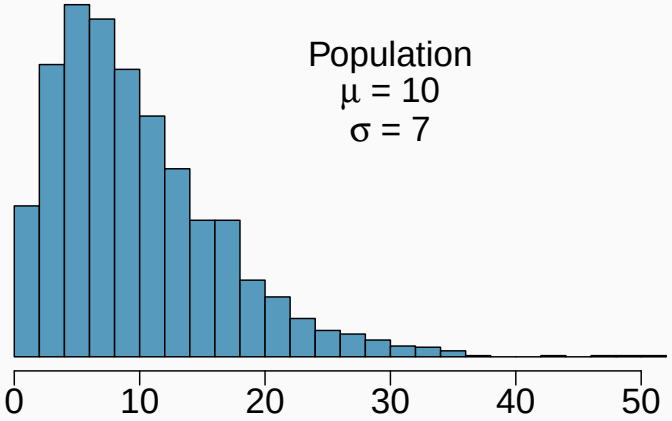
Four plots: Determine which plot (A, B, or C) is which.

(1) At top: 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.

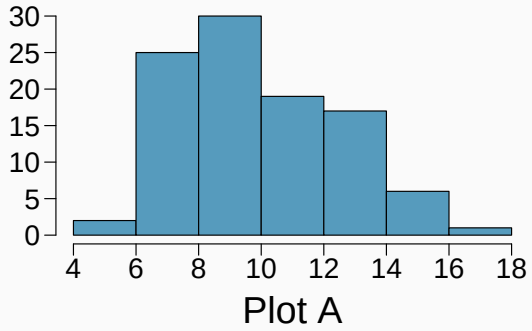


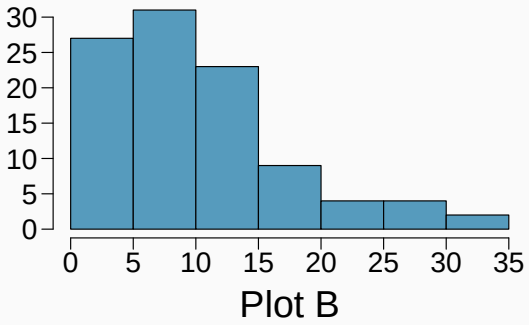
(a) A - (3); B - (2); C - (4)

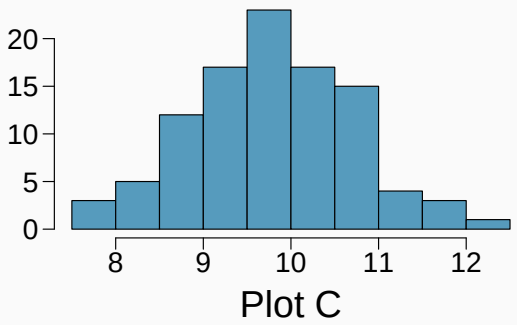
(b) A - (2); B - (3); C - (4)

(c) A - (3); B - (4); C - (2)

(d) A - (4); B - (2); C - (3)







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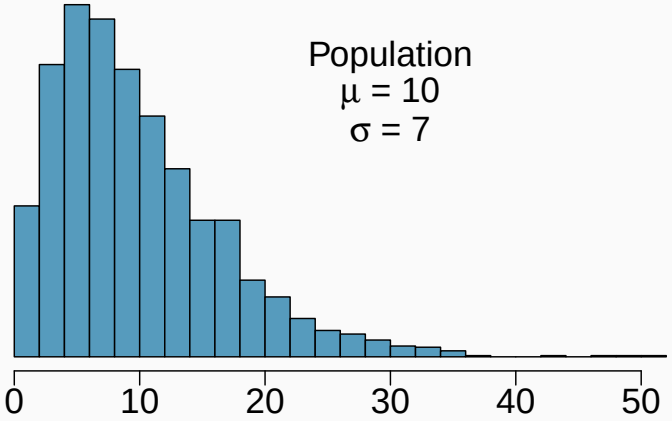

(a) *A - (3); B - (2); C - (4)*

(b) A - (2); B - (3); C - (4)

(c) A - (3); B - (4); C - (2)

(d) A - (4); B - (2); C - (3)