

Math 14, Chapters 7 and 8
Practice Test Questions

Write one true/false question for this group of characteristics:

Questions 1 – 2

Know the following characteristics of the distribution curve of the sample means of any distribution:

- The area under the curve is always 1.
- The tails never touch the axis.
- The curve is symmetric.
- The mean, median, and mode are equal.
- The mean is equal to the mean of the population, μ .
- The standard deviation is equal to $\frac{\sigma}{\sqrt{n}}$.

Write one true/false question for this group of characteristics:

Questions 3 – 5

Know the following characteristics of a confidence interval:

- CL represents the confidence level
- α represents the area under the tails
- $\alpha = 1 - \text{CL}$
- The higher the confidence, the larger the interval
- The larger the sample size, the higher the confidence
- The error bound is $z_{\frac{\alpha}{2}} \cdot \frac{\sigma}{\sqrt{n}}$

6. The length of songs in a collector's iTunes album collection is uniformly distributed from 3.1 to 5.3 minutes. Suppose we randomly pick 30 songs from the collection.

(a) Complete the summary notation for this distribution ($X \sim U(a, b)$).

$$X \sim \text{_____} (\text{_____} , \text{_____})$$

(b) For this distribution (to 5 decimal places x.xxxxx)

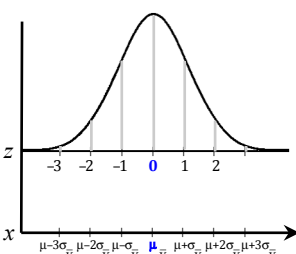
$$\mu = \frac{a+b}{2} = \text{_____} \quad \sigma = \sqrt{\frac{(b-a)^2}{12}} = \text{_____}$$

(c) Complete the summary notation for the distribution of sample means

($\bar{X} \sim N(\mu, \frac{\sigma}{\sqrt{n}})$). (Round to 4 decimal places x.xxxx)

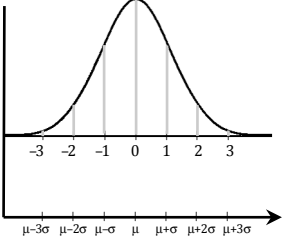
$$\bar{X} \sim \text{_____} (\text{_____} , \text{_____})$$

(d) What is the probability that the mean of the 30 songs is less than 4.4?

Step 1		Step 3
Identify the variable values	Label the X-axis with X_U , label the z-axis with z_U , shade the appropriate region 	Use the z-table or statistics calculator to find the associated area under the normal curve. Round to the nearest thousandth.
$\bar{X}_U =$ $\mu =$ $n =$ $\sigma =$		Step 4 Find the desired probability $P(X < \quad)$ $= P(z < \quad)$ $=$
Step 2		Step 4
Find $z_U = \frac{\bar{X}_U - \mu}{\frac{\sigma}{\sqrt{n}}}$		

7. Recently, a random sample of 30 cars from a large community got a mean mileage of 31.5 mpg per vehicle. The population standard deviation is 4.5 mpg per vehicle. Estimate the true mean gas mileage with 94% confidence.

Round your answer to the nearest tenth.

Step 1	Step 2
<p><i>(Round to 3 decimal places. x.xxx)</i></p> <p>$n =$ $CL =$</p> <p>$\frac{\sigma}{\sqrt{n}} =$ $\alpha =$</p>	<p>Use the z-table or a statistics calculator (invNorm function) to find: <i>(Round to 2 decimal places. x.xx)</i></p> <p>$z_{\frac{\alpha}{2}} =$</p> <p>$z_{\frac{\alpha}{2}} \cdot \frac{\sigma}{\sqrt{n}} =$</p>
<p>Shade approximately 94% of the area under the curve centered about the mean and label the x-axis with the confidence interval boundaries.</p> 	<p style="text-align: center;">Step 3</p> <p style="text-align: center;">Find the confidence interval such that</p> $P\left(\bar{X} - z_{\frac{\alpha}{2}}\left(\frac{\sigma}{\sqrt{n}}\right) < \mu < \bar{X} + z_{\frac{\alpha}{2}}\left(\frac{\sigma}{\sqrt{n}}\right)\right) = CL$ <p>The 94% confidence interval for the mean is</p> <p style="text-align: center;">(,)</p>

8. How large a sample is needed to estimate the true mean gas mileage within .25 mpg of the true population mean with a 94% confidence?

Use the formula: $E = z_{\frac{\alpha}{2}}\left(\frac{\sigma}{\sqrt{n}}\right)$