Math 14
Final Exam Study Guide

Reference

In a binomial experiment of n trials, where

p = probability of success and q = probability of failure

mean	$\mu = n \bullet p$
variance	$\sigma^2 = n \bullet p \bullet q$
standard deviation	$\sigma = \sqrt{n \bullet p \bullet q}$
Notation	$X \sim B(n, p)$
The probability of X successes in n trials can be found by using the formula:	$P(X) = {}_nC_X \bullet p^X \bullet q^{n-X}$

1. Write the summary notation of a binomial distribution.

For # 2 – 4:

The San Francisco Giants won 63 of 162 games in the 2017 baseball season. That's a winning average of 0.389.

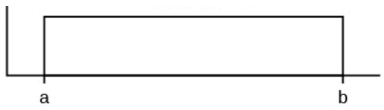
2. We are interested in the probability that the Giants will win 5 of the first 10 games in the 2018 season. What is the summary notation of this binomial experiment?

3. What is the probability that the Giants will win exactly 4 of the first 10 games in the 2018 season?

4. What is the mean number of games the Giants will likely win out of every 10 games they play in the 2018 season?

Reference

In a uniform distribution



mean $\mu = \frac{a+b}{2}$

standard deviation $\sigma = \sqrt{\frac{(b-a)^2}{12}}$

Notation $X \sim U(a, b)$

For # 5 – 10:

The length of songs in a certain iTunes collection is uniformly distributed from 2.8 to 3.4 minutes.

5. What is the summary notation of this distribution?

6. What is the mean of this distribution?

7. What is the standard deviation of this distribution?

8. What is the first quartile of this distribution?

9. What is the probability that a randomly chosen song will be longer than 3.2?

10. Draw the diagram represents the probability that a randomly chosen song will be longer than 3.2 as an area.

Reference

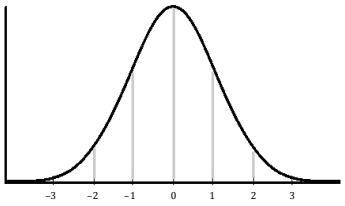
	Normal distribution	Standard normal distribution
Mean	μ	0
Standard deviation	σ	1
Notation	$X \sim N(\mu, \sigma)$	$Z \sim N(0, 1)$
Number of standard deviations away from the mean		$z = \dfrac{X - \mu}{\sigma}$

11. Which of the following is true of a normal distribution

12. Using the empirical rule, approximately what percentage of normally distributed data will fall within 1, 2, or 3 standard deviations of the mean?

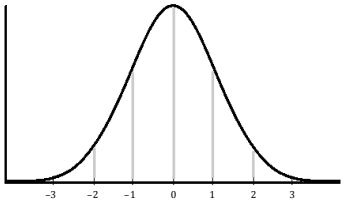
13. For a standard normal distribution, find $P(z > 0.35)$.

Shade the given curve.



14. For a standard normal distribution, find z_L and z_U for the middle 30%.

Shade the given curve.



15. For the normal distribution $X \sim N(120, 35)$ what is the approximate z-score of the data value $X = 62$?

For # 16 – 21:

The heights of 8 year old girls are normally distributed with a mean of 48 inches and a standard deviation of 1.5 inches.

16. Write the summary notation for this distribution.

17. What is the *z*-score approximately equivalent to 50 inches?

18. To find the probability that a randomly selected 8 year old girl's height is greater than 50 inches, draw the diagram that represents the probability as an area.

19. What is the probability that a randomly selected 8 year old girl's height is greater than 50 inches?

20. What is the cut-off height of the shortest 30% of 8 year old girls?

21. To find the cut-off height of the shortest 30% of 8 year old girls draw the diagram that represents the shortest 30% as an area?

Reference

For a Random Variable, X

	Distribution of X	**Distribution of Sample Means, $\bar{X}$**
Mean	μ	μ
Standard deviation	σ	$\frac{\sigma}{\sqrt{n}}$
Notation	Varies	$\bar{X} \sim N(\mu, \frac{\sigma}{\sqrt{n}})$

22. In the distribution curve of sample means,

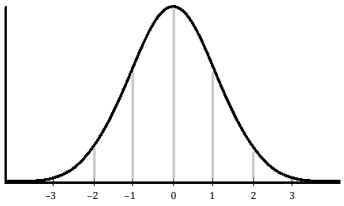
For #23 – 26:

The length of songs in a certain iTunes collection is uniformly distributed from 2.8 to 3.4 minutes. A random selection of 25 songs will be chosen.

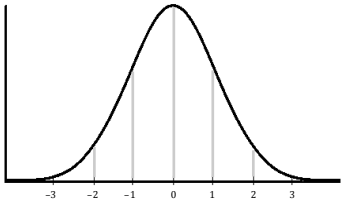
23. Write the summary notation for the distribution of sample means.

24. What is the *z*-score approximately equivalent to a sample mean of 3.15 minutes?

25. What is the probability that the mean of the chosen selection will be less than 3.15 minutes? Shade the given curve.



26. What song length marks the shortest 10% of the sample means? Shade the given curve.



Reference

Confidence Level	CL
Confidence Interval	$P\left(\bar{X} - z_{\frac{\alpha}{2}}\left(\frac{\sigma}{\sqrt{n}}\right) < \mu < \bar{X} + z_{\frac{\alpha}{2}}\left(\frac{\sigma}{\sqrt{n}}\right)\right) = CL$
Error bound	$E = z_{\frac{\alpha}{2}}\left(\frac{\sigma}{\sqrt{n}}\right)$

27. In a sample distribution,

For #28 – 29: At a certain college, a sample of 80 freshmen spent a mean of 9 hours studying for their finals. The population standard deviation is 1.5 hours.

28. To find a 90% confidence interval for the mean, you must use…

$z_{\frac{\alpha}{2}} =$

29. Find the 90% confidence interval for the mean of the number of hours freshmen spent studying for their finals.

30. A researcher wants to estimate within $200 the true average amount of money a county spends on road repairs each year. If she wants to be 98% confident, how large a sample is necessary? The standard deviation is known to be $850.

31. The mean of the sample distribution is _____ the mean of the population.

(a) greater than **(b)** less than **(c)** equal to **(d)** never equal to

32. The normal curve is

(a) symmetric **(b)** skewed right **(c)** circle **(d)** square

33. In determining a confidence interval, we use CL to represent the

(a) cat lady **(b)** comfort line **(c)** class level **(d)** confidence level

34. In a confidence interval, we use α to represent the

(a) confidence level **(b)** interval **(c)** error bound **(d)** area under the tails

35. The area under the normal curve is

(a) sometimes 2 **(b)** always 1 **(c)** never 1 **(d)** always 0

36. For a fixed sample size, a higher confidence level will cause the interval size to

(a) increase **(b)** decrease **(c)** remain the same **(d)** be invalid

37. Given a sample size of n, $\frac{\sigma}{\sqrt{n}}$ is the standard deviation of the

(a) population **(b)** sample **(c)** sample distribution **(d)** square

38. The mean, median, and mode are the same in a distribution that is

(a) skewed right **(b)** symmetric **(c)** skewed left **(d)** uniform

39. In a confidence interval, the confidence level is equivalent to

(a) α **(b)** $1 - \alpha$ **(c)** $1 - CL$ **(d)** $1 + CL$

40. In a confidence interval, the error bound is added to and subtracted from the

(a) population mean **(b)** confidence mean **(c)** error mean **(d)** sample mean