

Find the mean of the given probability distribution.

1)

x	P(x)
0	0.26
1	0.11
2	0.16
3	0.05
4	0.42

A) $\mu = 2.52$

B) $\mu = 2.16$

C) $\mu = 2.42$

D) $\mu = 2.26$

Use calculator. x on L1, P(x) on L2

1) _____

Provide an appropriate response. Round to the nearest hundredth.

2) Find the standard deviation for the given probability distribution.

x	P(x)
0	0.37
1	0.13
2	0.06
3	0.15
4	0.29

A) $\sigma = 2.90$

B) $\sigma = 1.70$

C) $\sigma = 2.52$

D) $\sigma = 1.81$

Use calculator. x on L1, P(x) on L2

2) _____

Provide an appropriate response.

3) Suppose you buy 1 ticket for \$1 out of a lottery of 1,000 tickets where the prize for the one winning ticket is to be \$500. What is your expected value?

A) \$0.00

B) -\$0.40

C) -\$0.50

D) -\$1.00

Expected value same as mean. Notice, the amount you win (if you win) = \$500 - \$1 = \$499

For $x = 499$, $p(x) = 1/1000$ and for $x = -1$, $p(x) = 0.999$

since $p(\text{losing}) = 1 - p(\text{winning})$

Notice that we use a minus for "losing \$1".

$p(\text{losing}) = 1 - 1/1000 = 0.999$

Use a calculator. Enter x in L1 and p(x) in L2

3) _____

Assume that a procedure yields a binomial distribution with a trial repeated n times. Use the binomial probability formula to find the probability of x successes given the probability p of success on a single trial. Round to three decimal places.

4) $n = 30$, $x = 12$, $p = 0.20$

A) 0.014

B) 0.006

C) 0.108

D) 0.003

Use calculator. Binomial pd or pdf, $n=30$, $p = 0.20$, $x = 12$. That is, find probability of 12 successes in 30 trials if the probability of success for each trial is 0.20

4) _____

Find the indicated probability. Round to three decimal places.

5) The participants in a television quiz show are picked from a large pool of applicants with approximately equal numbers of men and women. Among the last 11 participants there have been only 2 women. If participants are picked randomly, what is the probability of getting 2 or fewer women when 11 people are picked?

A) 0.033

B) 0.032

C) 0.006

D) 0.027

$P(\text{two or fewer}) = P(\text{at most two})$, Binomial cumulative distribution: cd or cdf:

Use calculator. Binomial cdf with $n=11$, $p = 0.50$, $x = 2$

Notice that since the number of men and women are approx equal, prob of selecting a women = 0.50

5) _____

Find the indicated probability.

- 6) An archer is able to hit the bull's-eye 51% of the time. If she shoots 10 arrows, what is the probability that she gets exactly 4 bull's-eyes? Assume each shot is independent of the others. 6) _____
A) 0.000936 B) 0.108 C) 0.0677 D) 0.197

Use calculator. Binomial pd or pdf, $n=10$, $p = 0.51$, $x = 4$

- 7) A company manufactures calculators in batches of 55 and claims that the rate of defects is 5%. Find the probability of getting exactly 3 defects in a batch of 55 if the rate of defects is 5%. If a store receives a batch of 55 calculators and finds that there are 3 defective calculators, do they have any reason to doubt the company's claimed rate of defects? 7) _____
A) 0.0180; Yes. If the rate of defects is really 5%, the probability of finding 3 defects in a batch of 55 calculators is very small.
B) 0.228; No. If the rate of defects is really 5%, it is not so unlikely to find 3 defects in a batch of 55 calculators.
C) 0.237; No. If the rate of defects is really 5%, it is not so unlikely to find 3 defects in a batch of 55 calculators.
D) 1.37; No. If the rate of defects is really 5%, it is not so unlikely to find 3 defects in a batch of 55 calculators.

Use calculator. Binomial pd or pdf, $n=55$, $p = 0.05$, $x = 3$.

Since the prob of getting 3 defective = 0.228 which is > 0.05 the event is not unusual or unlikely.

Find the mean, μ , for the binomial distribution which has the stated values of n and p . Round answer to the nearest tenth.

- 8) $n = 38$; $p = 0.2$ 8) _____
A) $\mu = 7.6$ B) $\mu = 7.1$ C) $\mu = 8.3$ D) $\mu = 7.9$

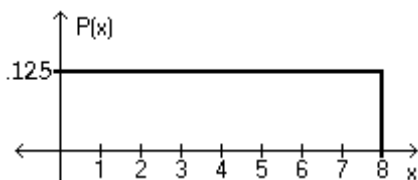
$\mu = n * p = 38 * 0.2 = 7.6$

Solve the problem.

- 9) The probability of winning a certain lottery is $\frac{1}{70,422}$. For people who play 545 times, find the mean number of wins. 9) _____
A) 129.2 B) 0.0077 C) 0.000014 D) 0.0018

$\mu = n * p = 545 * 1/70422 = 0.0077$

Using the following uniform density curve, answer the question.



- 10) What is the probability that the random variable has a value less than 6? 10) _____
A) 0.750 B) 0.875 C) 0.625 D) 0.500

Prob = Area of rectangle = length * height = $6 * 0.125 = 0.750$

If z is a standard normal variable, find the probability.

- 11) The probability that z lies between -0.55 and 0.55 11) _____
A) -0.9000 B) -0.4176 C) 0.9000 D) 0.4176

Normal cdf with lower bound -0.55 and upper bound 0.55 (for z scores $\mu = 0$, $\sigma=1$, default values on calculators).

- 12) $P(z < 0.97)$ 12) _____
 A) 0.8315 B) 0.8078 C) 0.8340 D) 0.1660
 Normal cdf with lower bound $-\infty$ and upper bound 0.97

Assume that X has a normal distribution, and find the indicated probability.

- 13) The mean is $\mu = 22.0$ and the standard deviation is $\sigma = 2.4$. 13) _____
 Find the probability that X is between 19.7 and 25.3.
 A) 0.4107 B) 0.3370 C) 0.7477 D) 1.0847
 Normal cdf with lower bound 19.7 and upper bound 25.3; $\mu = 22, \sigma = 2.4$

Find the indicated probability.

- 14) The diameters of pencils produced by a certain machine are normally distributed with a mean of 0.30 inches and a standard deviation of 0.01 inches. What is the probability that the diameter of a randomly selected pencil will be less than 0.285 inches? 14) _____
 A) 0.9332 B) 0.0596 C) 0.4332 D) 0.0668
 Normal cdf with lower bound $-\infty$ and upper bound 0.285; $\mu = 0.30, \sigma = 0.01$

Solve the problem.

- 15) Assume that women's heights are normally distributed with a mean of 63.6 inches and a standard deviation of 2.5 inches. If 90 women are randomly selected, find the probability that they have a mean height between 62.9 inches and 64.0 inches. 15) _____
 A) 0.0424 B) 0.7248 C) 0.1739 D) 0.9318
 Normal cdf with lower bound 62.9 and upper bound 64.0; $\mu = 63.6, \sigma = 2.5/\sqrt{90}$
 Notice that there is a sample of 90 women; therefore, divide σ by square root of 90, $\sqrt{90}$

- 16) Human body temperatures are normally distributed with a mean of 98.20°F and a standard deviation of 0.62°F. If 19 people are randomly selected, find the probability that their mean body temperature will be less than 98.50°F. 16) _____
 A) 0.9826 B) 0.3343 C) 0.0833 D) 0.4826
 Normal cdf with lower bound $-\infty$ and upper bound 98.5; $\mu = 98.2, \sigma = 0.62/\sqrt{19}$
 The sample, in this case, consists of 19 people; therefore, divide σ by $\sqrt{19}$.

Find the indicated critical z value.

- 17) Find the critical value $z_{\alpha/2}$ that corresponds to a 93% confidence level. 17) _____
 A) 2.70 B) 1.81 C) 1.48 D) 1.96
 Inverse normal (on calculator), with area = $\alpha/2$
 $\alpha = 1 - 0.93 = 0.07$ Therefore, $\alpha/2 = 0.07/2 = 0.035$ and $\mu = 0, \sigma = 1$ (default values for z scores)

Express the confidence interval using the indicated format.

- 18) Express the confidence interval $0.65 < p < 0.79$ in the form of $\hat{p} \pm E$. 18) _____
 A) 0.72 ± 0.07 B) 0.72 ± 0.14 C) 0.65 ± 0.14 D) 0.65 ± 0.07

$$\hat{p} = (\text{lower bound} + \text{upper bound})/2 = (0.65 + 0.79)/2 = 0.72 \quad E = (\text{Upper bound} - \text{Lower bound})/2$$

$$E = (0.79 - 0.65)/2 = 0.07$$

Assume that a sample is used to estimate a population proportion p . Find the margin of error E that corresponds to the given statistics and confidence level. Round the margin of error to four decimal places.

- 19) 95% confidence; $n = 380$, $x = 50$ 19) _____
 A) 0.0306 B) 0.0408 C) 0.0357 D) 0.0340

Calculators: 1PropZInt with $n = 380$, $x = 50$, C-Level: 0.95
 Obtain the interval: 0.09759, 0.16557 and $E = (\text{Upper bound} - \text{Lower bound})/2 = 0.03399 = 0.040$

Use the given degree of confidence and sample data to construct a confidence interval for the population proportion p .

- 20) $n = 56$, $x = 30$; 95% confidence 20) _____
 A) $0.404 < p < 0.668$ B) $0.425 < p < 0.647$
 C) $0.405 < p < 0.667$ D) $0.426 < p < 0.646$

Calculators: 1PropZInt with $n = 56$, $x = 30$, C-Level: 0.95

- 21) A survey of 300 union members in New York State reveals that 112 favor the Republican candidate for governor. Construct the 98% confidence interval for the true population proportion of all New York State union members who favor the Republican candidate. 21) _____
 A) $0.308 < p < 0.438$ B) $0.304 < p < 0.442$
 C) $0.301 < p < 0.445$ D) $0.316 < p < 0.430$

Calculators: 1PropZInt with $n = 300$, $x = 112$, C-Level: 0.98

Use the given data to find the minimum sample size required to estimate the population proportion.

- 22) Margin of error: 0.09; confidence level: 99%; \hat{p} and \hat{q} unknown 22) _____
 A) 138 B) 239 C) 205 D) 224

Sample size formula (proportions), $n = (z_{\alpha/2})^2 * 0.25/E^2 = 2.575^2 * 0.25 / 0.09^2 = 204.64 = 205$

Use the given degree of confidence and sample data to construct a confidence interval for the population mean μ . Assume that the population has a normal distribution.

- 23) $n = 30$, $\bar{x} = 84.6$, $s = 10.5$, 90% confidence 23) _____
 A) $80.68 < \mu < 88.52$ B) $79.32 < \mu < 89.88$
 C) $81.36 < \mu < 87.84$ D) $81.34 < \mu < 87.86$

T interval with: $\bar{x} = 84.6$, $s_x = 10.5$, $n = 30$, C-Level: 0.95

- 24) Thirty randomly selected students took the calculus final. If the sample mean was 95 and the standard deviation was 6.6, construct a 99% confidence interval for the mean score of all students. 24) _____
 A) $92.95 < \mu < 97.05$ B) $91.68 < \mu < 98.32$
 C) $92.03 < \mu < 97.97$ D) $91.69 < \mu < 98.31$

T interval with: $\bar{x} = 95$, $s_x = 6.6$, $n = 30$, C-Level: 0.99

- 25) The football coach randomly selected ten players and timed how long each player took to perform a certain drill. The times (in minutes) were: 25) _____
 7.0, 10.8, 9.5, 8.0, 11.5, 7.5, 6.4, 11.3, 10.2, 12.6
 Determine a 95% confidence interval for the mean time for all players.
 A) $7.83 \text{ min} < \mu < 11.03 \text{ min}$ B) $7.95 \text{ min} < \mu < 11.01 \text{ min}$
 C) $10.93 \text{ min} < \mu < 8.03 \text{ min}$ D) $11.03 \text{ min} < \mu < 7.93 \text{ min}$

T interval with raw data. Enter data on List 1, then proceed with T-Interval.

Use the given information to find the minimum sample size required to estimate an unknown population mean μ .

26) Margin of error: \$126, confidence level: 95%, $\sigma = \$524$

26) _____

A) 67

B) 47

C) 94

D) 59

$$\text{Sample size, mean: } n = [(z_{\alpha/2} * \sigma) / E]^2 = [(1.96 * 524) / 126]^2 = 66.44 = 67$$

Notice that for sample size determination we always round the result up.

Use the confidence level and sample data to find a confidence interval for estimating the population μ . Round your answer to the same number of decimal places as the sample mean.

27) Test scores: $n = 72$, $\bar{x} = 58.1$, $\sigma = 6.2$; 98% confidence

27) _____

A) $56.9 < \mu < 59.3$

B) $56.7 < \mu < 59.5$

C) $56.2 < \mu < 60.0$

D) $56.4 < \mu < 59.8$

Interval for means, σ given; therefore, this is a Z-Interval with $n = 72$, $\bar{x} = 58.1$, $\sigma = 6.2$; C-Level: 0.98

Answer Key

Testname: REVIEW02V

- 1) D
- 2) B
- 3) C
- 4) B
- 5) A
- 6) D
- 7) B
- 8) A
- 9) B
- 10) A
- 11) D
- 12) C
- 13) C
- 14) D
- 15) D
- 16) A
- 17) B
- 18) A
- 19) D
- 20) C
- 21) A
- 22) C
- 23) D
- 24) B
- 25) B
- 26) A
- 27) D