1. A computer manufacturer is worried that a high proportion of their products are defective when shipped. The CEO assigns Tom to investigate. Tom systematically selects every 25th computer produced and tests whether it is defective (for a total of 150 computers tested). He finds that 58% of the sampled computers are defective.

   For the scenario above, identify the **sample**.

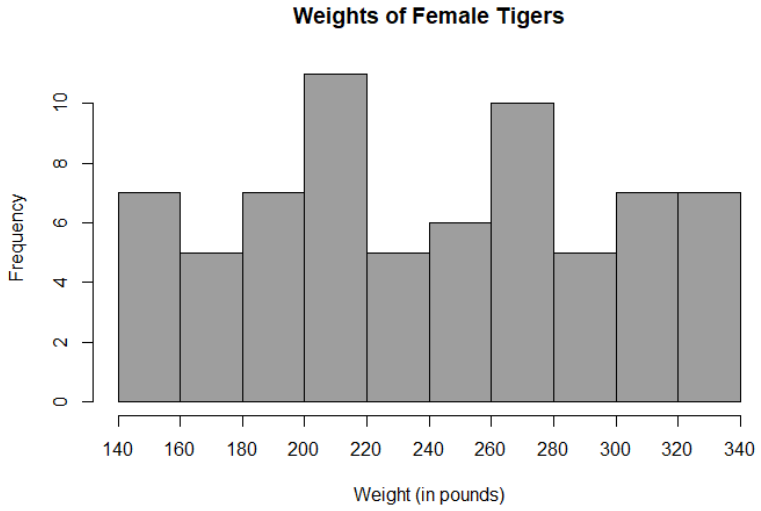
   (A) The 58% of computers that are defective.

   (B) All computers manufactured by the company.

   (C) The 150 tested computers.

   (D) Tom.

2. The weights for a sample of 70 female tigers are displayed in the histogram below. From the histogram, what percentage of female tigers weighed between 220 pounds and 280 pounds?



   (A) 21.0% **(B)** 25.0% **(C)** 57.1% **(D)** 30.0%

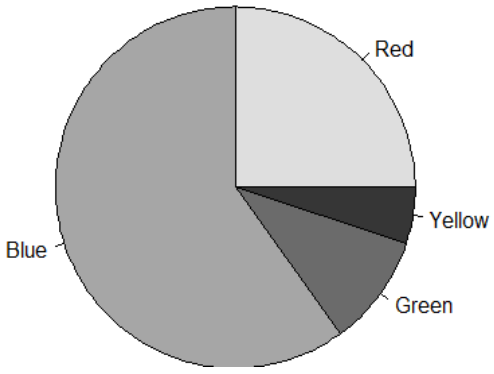
3. The pie chart to the right summarizes the distribution of colors in a pack of candy. **Approximately**, what percentage of the candy is blue?

   (A) 90%

   (B) 25%

   (C) 60%

   (D) 5%



4. A census of 100 college students shows that 52 students are female, 65 students like video games, and 30 students are female and like video games. If one college student is randomly selected, what is the probability they are a female or like video games?

(A) 1.17 **(B)** 0.95 **(C)** 0.82 **(D)** 0.87

5. A class consists of 40 students of which 15 are freshmen, 4 are sophomores, and 21 are juniors. A teacher wants to select two different students (without replacement) at random. What is the probability that the teacher selects a freshman and then a junior?

(A) 0.202 **(B)** 0.197 **(C)** 0.188 **(D)** 0.900

6. Three cable channels have quiz shows, comedies, and dramas as part of their broadcast lineup. The number of each is shown in the table below. If one show is randomly selected, find the probability the show is a comedy given that it is on Channel 10.

	Channel 7	**Channel 8**	**Channel 10**	**Total**
Quiz Show	5	2	1	8
Comedy	3	2	8	13
Drama	4	4	1	9
Total	12	8	10	30

(A) 0.77 **(B)** 0.33 **(C)** 0.80 **(D)** 0.62

7. A paper company has 15 employees. The regional manager wishes to select three employees at random and without regard to order for a project. How many groups of three students are possible?

(A) 2730 **(B)** 455 **(C)** 42 **(D)** 3375

8. A recent study of teenagers found 79.2% of teenagers have tried vaping at some point. Find the probability that a randomly selected teenager has **not** tried vaping at some point.

(A) 0.792 **(B)** 0.164 **(C)** 0.835 **(D)** 0.208

9. Below are the zinc concentrations (in mg) for 12 water samples. Find the sample mean.

1.6	2.0	2.4	3.0	3.0	3.1
3.4	3.5	3.7	3.9	4.3	4.6

(A) 3.21 mg **(B)** 3.25 mg **(C)** 3.75 mg **(D)** 0.89 mg

10. Below are the zinc concentrations (in mg) for 12 water samples. Find the sample variance.

1.6	2.0	2.4	3.0	3.0	3.1
3.4	3.5	3.7	3.9	4.3	4.6

(A) 0.85 mg **(B)** 0.73 mg^2 **(C)** 0.80 mg^2 **(D)** 0.89 mg

11. Below are the zinc concentrations (in mg) for 12 water samples. Find P_{25}.

1.6	2.0	2.4	3.0	3.0	3.1
3.4	3.5	3.7	3.9	4.3	4.6

(A) 2.70 mg **(B)** 3.25 mg **(C)** 2.40 mg **(D)** 3.00 mg

12. A random sample of runners recorded the number of miles run during one week. Estimate the mean number of miles run.

Speed	Frequency
5 – 9	1
10 – 14	5
15 – 19	10
20 – 24	20
25 – 29	9
30 – 34	6
35 - 39	2

(A) 13.7 miles **(B)** 22.4 miles **(C)** 7.8 miles **(D)** 28.1 miles

13. For the stemplot (stem-and-leaf plot) below, what is the range?

Key: 5 | 2 2 7 = 52, 52, 57

Stem	Leaves
1	0 1 1 1 1 2 8 9
2	2 3 6 6 7 8
5	1 1 3 4 5 5 5

(A) 40 **(B)** 45 **(C)** 4 **(D)** 41

14. The heights of Canadian women have an average of 64.1 inches and a standard deviation of 2.5 inches. Find the z-score for a Canadian women who is 60.0 inches tall.

(A) z-score $= 1.64$

(B) z-score $= -1.60$

(C) z-score $= -4.10$

(D) z-score $= -1.64$

15. The probability distribution for the number of absences per student during a summer chemistry course is given below. Find the probability that a student will have at most 1 absence during the course.

x	0	1	2	3	4
$P(X = x)$	0.20	0.11	0.30	0.06	0.33

(A) 0.11 **(B)** 0.20 **(C)** 0.31 **(D)** 0.80

16. The probability distribution for the number of absences per student during a summer chemistry course is given below. Find the mean number of absences during the course.

x	0	1	2	3	4
$P(X = x)$	0.20	0.11	0.30	0.06	0.33

(A) 2.45 **(B)** 2.00 **(C)** 0.20 **(D)** 2.21

17. The probability distribution for the number of absences per student during a summer chemistry course is given below. Find the standard deviation of the number of absences during the course.

x	0	1	2	3	4
$P(X = x)$	0.20	0.11	0.30	0.06	0.33

(A) 2.25 **(B)** 2.50 **(C)** 0.12 **(D)** 1.50

18. A basketball player is shooting 5 free throws. If their shots are independent and there is an 80% chance of making the shot, find the probability the player makes at most 2 shots.

(A) 0.263 **(B)** 0.051 **(C)** 0.058 **(D)** 0.205

19. It is reported that 77% of workers aged 16 or over drive to work alone. A random sample of 8 workers is taken. Find the mean number of workers out of 8 that drive to work alone.

(A) 12.32 **(B)** 1.84 **(C)** 7.84 **(D)** 6.16

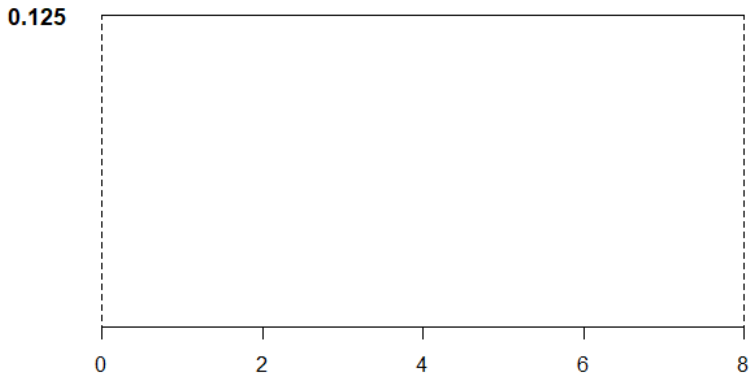
20. It is reported that 77% of workers aged 16 or over drive to work alone. A random sample of 8 workers is taken. Find the standard deviation for the number of workers out of 8 that drive to work alone.

(A) 1.42 **(B)** 0.59 **(C)** 1.19 **(D)** 2.01

21. The number of power failures Columbia Power Company experiences per month follows a Poisson distribution with a rate of 1.1 power failures per month. Find the probability that during a randomly selected month, the company experiences exactly three power failures.

(A) 0.074 **(B)** 0.926 **(C)** 0.201 **(D)** 0.974

22. For the uniform distribution shown below, find the probability that the random variable is greater than 1.4.



(A) 0.175 **(B)** 0.125 **(C)** 0.825 **(D)** 0.911

23. The annual precipitation totals in a certain mountain range are normally distributed with a mean of 99 inches and a standard deviation of 14 inches. What is the probability that one randomly selected year will have a precipitation total greater than 101.8 inches?

(A) 0.579 **(B)** 0.028 **(C)** 0.421 **(D)** 0.623

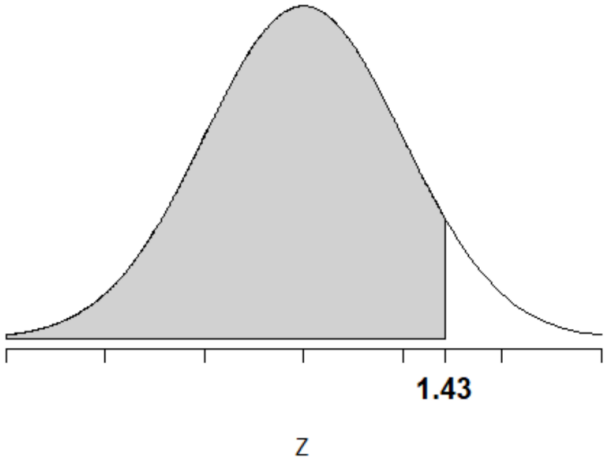
24. The annual precipitation totals in a certain mountain range are normally distributed with a mean of 99 inches and a standard deviation of 14 inches. What is the probability that during 49 randomly selected years the mean annual precipitation total will be between 96 and 98 inches?

(A) 0.472 **(B)** 0.242 **(C)** 0.328 **(D)** 0.056

25. Australian men have heights that are normally distributed with a mean of 175 cm and a standard deviation of 10 cm. Find the 36^{th} percentile of Australian mens' heights.

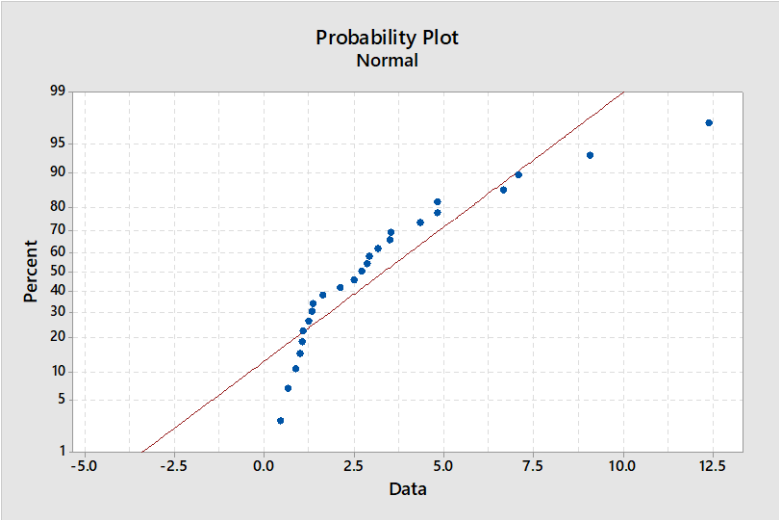
(A) 171.4 cm **(B)** 178.6 cm **(C)** 166.6 cm **(D)** 139.0 cm

26. Find the area of the shaded region under the standard normal curve shown in the plot below.



(A) 0.076 **(B)** 0.856 **(C)** 0.908 **(D)** 0.924

27. Based on the normal probability plot below, is the sample taken from a normal distribution?



(A) Yes, because the points follow a roughly straight-line pattern.

(B) No, because the points do not follow a roughly straight-line pattern.

(C) No, because the slope is negative.

(D) Yes, because the slope is positive.

28. Find the following z-critical value: $z_{0.02}$.

(A) 1.751 **(B)** 2.054 **(C)** 2.326 **(D)** 2.576

29. A random sample of 20 M&Ms is taken. Of the sampled M&Ms, 5 were red, 7 were blue, 2 were orange, 1 was green, 1 was yellow, and 4 were brown. What proportion of the sampled M&Ms are orange?

(A) 0.10 **(B)** 0.80 **(C)** 0.35 **(D)** 0.05

30. A researcher wants to estimate the proportion of adults who have a Facebook account with 90% confidence. It is believed that 85% of adults have a Facebook account. Using this information, what is the smallest number of adults that must be sampled in order for the estimate to be within 7% of the true proportion?

(A) 28 **(B)** 43 **(C)** 139 **(D)** 71

31. A professor wants to estimate the proportion of students that are overweight. Determine the smallest sample size needed to be 95% confident that the estimate is within 2% of the true proportion.

(A) 4147 **(B)** 2401 **(C)** 33 **(D)** 1691

32. Find the P-value for testing H_0: $p = 0.3$ versus H_A: $p > 0.3$ if the test statistic is $z = 2.49$.

(A) 0.018 **(B)** 0.006 **(C)** 0.013 **(D)** 0.994

33. Lawmakers claim that the proportion of Tennessee women in the labor force is different from 78%, the national average. Determine the null and alternative hypotheses for testing this claim.

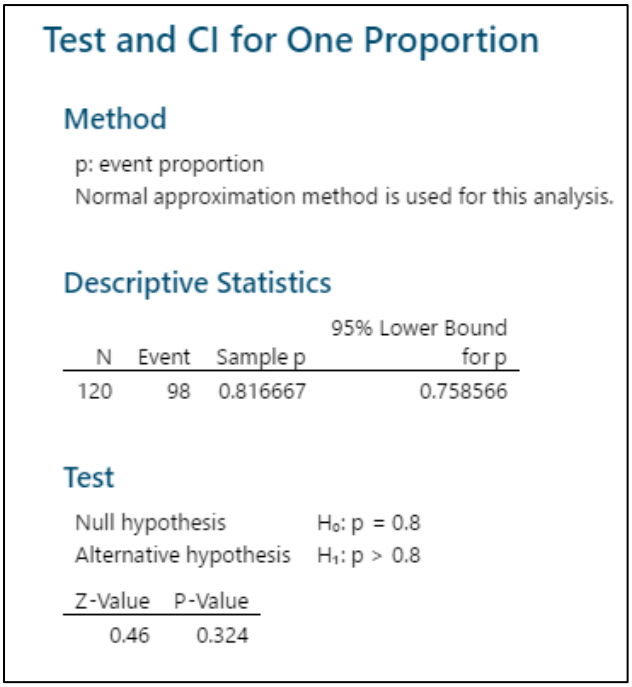
(A) H_0: $p = 0.78$
H_A: $p \neq 0.78$

(B) H_0: $p \neq 0.78$
H_A: $p = 0.78$

(C) H_0: $p = 0.78$
H_A: $p > 0.78$

(D) H_0: $\mu = 0.78$
H_A: $\mu \neq 0.78$

34. A hospital executive believes that more than 80% of patients at her hospital are satisfied with the care they receive. To verify she randomly samples patients treated at the hospital in the last year. Use the Minitab 19 results below to determine the test statistic for testing the executive's claim?



Test and CI for One Proportion

Method

p: event proportion
Normal approximation method is used for this analysis.

Descriptive Statistics

N	Event	Sample p	95% Lower Bound for p
120	98	0.816667	0.758566

Test

Null hypothesis $H_0: p = 0.8$
Alternative hypothesis $H_1: p > 0.8$

Z-Value	P-Value
0.46	0.324

(A) 0.759 **(B)** 0.460 **(C)** 0.817 **(D)** 0.324

35. A hypothesis test determines that the proportion of defective toys is different from some historical value. Of 346 randomly selected toys, 53 are found to be defective. Find a 98% confidence interval for the true proportion of all toys that are defective.

(A) $0.108 < p < 0.198$
(B) $0.121 < p < 0.185$
(C) $0.113 < p < 0.193$
(D) $0.130 < p < 0.176$

36. It is claimed that the proportion of Hawaiians (H) under 30 years of age is less than the proportion of Alaskans (A) under 30 years old. Determine the null and alternative hypotheses for testing this claim.

(A) $H_0: p_H = p_A$
$H_A: p_H > p_A$

(B) $H_0: p_H = p_A$
$H_A: p_H < p_A$

(C) $H_0: p_H = p_A$
$H_A: p_H \neq p_A$

(D) $H_0: p_H < p_A$
$H_A: p_H = p_A$

37. Dr. Carver wishes to compare the proportion of freshman and seniors who attend at least one athletic event during the academic year. Dr. Carver takes a simple random sample of 200 freshmen and finds that 145 have attended at least one athletic event during the academic year. He also takes a simple random sample of 120 seniors and finds that 80 have attended at least one athletic event during the academic year. Compute the P-value used to test the claim that the proportion of freshman who attend at least one athletic event during the academic year is different than that of seniors.

(A) 0.134 **(B)** 0.149 **(C)** 1.106 **(D)** 0.269

38. A hypothesis test concludes that there is a difference between the proportion of defective Samsung phones and Apple phones. For a simple random sample of 102 Samsung phones (group 1), 26 are defective. For another simple random sample of 125 Apple phones (group 2), 12 are defective. Compute the 90% confidence interval for the true difference in the proportion of Samsung phones and Apple phones that are defective, $p_1 - p_2$.

(A) $-0.001 < p_1 - p_2 < 0.185$

(B) $0.060 < p_1 - p_2 < 0.258$

(C) $0.076 < p_1 - p_2 < 0.242$

(D) $0.011 < p_1 - p_2 < 0.170$

39. In studying the occurrence of genetic characteristics, the following sample data were obtained. Find the test statistic to test the claim that the characteristics occur with equal frequency.

Characteristic	**A**	**B**	**C**	**D**	**E**	**F**
Frequency	28	30	45	48	38	39

(A) 7.01 **(B)** 8.72 **(C)** 8.26 **(D)** 9.11

40. Consider the following hypotheses.

H_0: Your television is working.
H_A: Your television is not working.

Which of the following is the Type I error?

(A) Concluding that your television **is working** when, in fact, it **is working**.

(B) Concluding that your television **is working** when, in fact, it **is not working**.

(C) Concluding that your television **is not working** when, in fact, it **is not working**.

(D) Concluding that your television **is not working** when, in fact, it **is working**.

41. Using the same simple random sample, Bob constructs a 90% confidence interval and Sally constructs a 97% confidence interval to estimate the true value of some parameter. How will the two confidence intervals compare?

(A) Bob's 90% confidence interval will be **wider than** Sally's 97% confidence interval.

(B) Bob's 90% confidence interval will be **narrower than** Sally's 97% confidence interval.

(C) Bob's 90% confidence interval will be **the same width as** Sally's 97% confidence interval.

42. A convenience store wants to estimate their mean daily sales with a 99% confidence interval. It is believed that the population standard deviation is \$533. What is the minimum number of repair costs that must be sampled so that the margin of error is \$120?

(A) 273 **(B)** 107 **(C)** 131 **(D)** 33

43. A farmer claims that the mean height for all crops is larger than 50 inches. Determine the null and alternative hypotheses for testing this claim.

(A) H_0: $\bar{x} = 50$
H_A: $\bar{x} < 50$

(B) H_0: $\mu = 50$
H_A: $\mu < 50$

(C) H_0: $\mu = 50$
H_A: $\mu > 50$

(D) H_0: $\bar{x} = 50$
H_A: $\bar{x} > 50$

44. Currently, it is believed that shoppers at a local mall spend a mean amount of \$70 per visit. After making changes to their advertising, marketing managers found that for 26 randomly selected shoppers, the average amount spent is \$66 with a standard deviation is \$8. Assume that the sample come from a normal population. Find the test statistic for testing the claim that the mean amount spent by shoppers per visit has decreased from \$70.

(A) -2.550 **(B)** 0.009 **(C)** 0.017 **(D)** -2.451

45. Consider testing the claim that the mean of a population is greater than 6.6 at a 0.01 significance level. If the P-value $= 0.0023$, what is the decision?

(A) Reject H_0 because P-value $> \alpha$.

(B) Reject H_0 because P-value $\leq \alpha$.

(C) Do not reject H_0 because P-value $> \alpha$.

(D) Do not reject H_0 because P-value $\leq \alpha$.

46. A group of 51 randomly selected students have a mean placement test score of 20.2 with a standard deviation of 4.6. Construct a 95% confidence interval for the true mean placement test score of all students. Assume the population is normally distributed.

(A) $19.1 < \mu < 21.4$

(B) $18.6 < \mu < 21.8$

(C) $18.9 < \mu < 21.5$

(D) $19.1 < \mu < 21.3$

47. The commute time (in minutes) for drivers in both Miami (population 1) and Baltimore (population 2) are recorded. Using the summary information given below, compute the P-value used to test the claim that the mean commute time is greater for Baltimore. Assume $\sigma_1 \neq \sigma_2$.

Miami	Baltimore
$\bar{x}_1 = 30.5$	$\bar{x}_2 = 35.2$
$s_1 = 7.2$	$s_2 = 9.1$
$n_1 = 35$	$n_2 = 40$

(A) 0.149 **(B)** 0.993 **(C)** -2.494 **(D)** 0.007

48. Suppose you wish to test the claim that μ_d, the mean value of the differences for a population of paired data, is greater than 0. Given a sample of $n = 12$ pairs with a sample mean of $\bar{x}_d = 4$ and a sample standard deviation of $s_d = 3.7$, compute the test statistic for the hypothesis test?

(A) 3.745 **(B)** 0.002 **(C)** 3.204 **(D)** 3.511

49. For 8 randomly selected vehicles the engine size (x) and city gas mileage (y) are recorded. Find the sample Pearson correlation coefficient, r, for the data below.

Engine Size (x)	6.2	5.4	3.0	5.0	3.7	3.6	5.0	6.4
Gas Mileage (y)	13	11	20	13	19	17	15	14

(A) -0.837 **(B)** -0.700 **(C)** 0.700 **(D)** 0.837

50. For 8 randomly selected vehicles the engine size (x) and city gas mileage (y) are recorded. Find the equation of the least squares regression line for the data below.

Engine Size (x)	6.2	5.4	3.0	5.0	3.7	3.6	5.0	6.4
Gas Mileage (y)	13	11	20	13	19	17	15	14

(A) $\hat{y} = 25.389x + 2.118$

(B) $\hat{y} = -3.742 + 0.010x$

(C) $\hat{y} = 25.389 - 2.118x$

(D) $\hat{y} = 25.389x - 2.118$