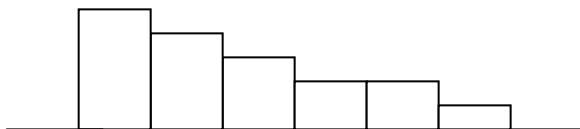


AP STATISTICS
(Warm-Up Exercises)

1. Describe the distribution of ages in a city:



2. Graph a box plot on your calculator for the following test scores:
{90, 80, 96, 54, 80, 95, 100, 75, 87, 62, 65, 85, 92, 87, 74, 89}
3. Draw a stem and leaf plot for the data in problem 3.
4. If the test scores from problem 3 come from a normal distribution with $\mu = 80$, $\sigma = 5$ then
- calculate the z-score for a score of 90
 - use your calculator to find the percent of scores below 92
 - use your calculator to find the percent of scores greater than 87
 - what score would be at the 90th percentile?
5. Jeff made a 90 on his Algebra I test. The class average is 83 and the standard deviation is 5. Mary made a 95 on her test in another class. Her class average is 85 and the standard deviation is 8. Who did better relative to his/her peers?
6. Calculate r^2 , r and the equation for the LSRL for:
Quiz average X = {90, 82, 97, 90, 85, 73, 98, 45, 79, 86}
Quiz Average Y = {87, 80, 95, 70, 88, 72, 95, 52, 80, 82}
7. Is there a linear relationship in the data from problem 6?
8. Given $r = .9867$, $r^2 = .9736$ and $y = .035 + .72x$, what percent of the change in y is caused by x ?
9. If a residual plot reveals that a linear regression is not appropriate for 2 variables, what is the next step in finding the prediction equation?
10. Using the data in the table below, find the distribution of grades for those enrolled in the program.

Grade	Enrolled In Program?	
	Yes	No
A or B	12	5
C or D	9	8
F	4	12

11. Design an experiment for testing a new drug on a sample of 60 subjects.
12. Design a simulation that would replicate the probabilities for selecting a person based on ethnicity in the US if 60% are white, 20% black and 20% other.
13. What is probability?
14. Let random variable X = number of composite numbers (4 or 6) when rolling 3 dice.

The probability distribution is below. Calculate the mean.

X	0	1	2	3
P(X)	.037	.444	.222	.296

15. Using the probability model above,
 - a. calculate $P(X \leq 1)$
 - b. determine the complement for $X = 3$
16. Given a bag of M&Ms {3Br, 2R, 2Y, 1O, 1Bl, 1Gr}, let X = number of brown M&Ms chosen. If you choose 3 M&Ms at random, with replacement, find $P(X = 1)$.
17. If a population is skewed right, describe a sampling distribution of the population with a sample size of 50.
18. What is the standard deviation of a sampling distribution if $\sigma = 4.2$ and $n = 50$?
19. In a certain skewed population of 50,000 people, $P(\text{blue eyes}) = .42$. A sample size of 40 is taken. Is the sampling distribution normal?
20. List the steps for:
 - a. Calculating a confidence interval
 - b. Performing a hypothesis test
21. At a bakery, loaves of bread are supposed to weigh 1 pound. You believe the loaves are heavier than 1 pound and want to test your hypothesis. You weigh 20 loaves and obtain a mean weight of 1.05 pounds with $s = .13$.
 - a. Identify the population
 - b. Identify the parameter of interest
 - c. Test your hypothesis

22. Given the distribution of SAT scores is normal with $\sigma = 40$, a random sample of scores from a school is taken: 1070, 1280, 1000, 1210, 1100, 980, 1350, 900, 1050, 1280, 1120, 1090, 1240, 1350, 1190, 1020.
- Calculate a 90% confidence interval for the average SAT score of all students in the school.
 - Is there statistical evidence to claim the average SAT score at this school is 1150?
23. A teacher believes the average IQ of her students is lower than 100. He finds the IQs of 6 students selected randomly: 90, 92, 94, 102, 100 and 95. Is there statistical evidence to support his hypothesis?
24. What is the critical value t^* for a 95% confidence interval from a sample size of 9?
25. Below are the results of SAT math scores for 13-year olds:

Group	Size	\bar{x}	s
Males	19,883	416	87
Females	19,937	386	74

Give a 99% confidence interval for the difference between the mean score for males and the mean score for females and interpret the interval.

26. Last year, Tyler made 40% of his free throws. In the first 8 games of this year's season, he made 25 out of 40 free throws.
- Verify the conditions for performing a significance test.
 - Determine if Tyler's free throw shooting has improved over last year and state your conclusion at the $\alpha = .01$ level
27. State the conditions for a chi-square test.
28. Below are the results of a local election:

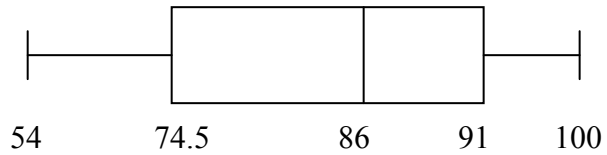
Gender	Voted	Did Not Vote
Male	2,792	1,486
Female	3,591	2,131

Determine if there was an association between gender and voter participation.

ANSWERS

1. Skewed right

2.



3.

10	0
9	0256
8	005779
7	45
6	25
5	4

4. a. $z = 2$

b. $\text{normalcdf}(0, 92, 80, 5) = .992$ or 99.2%

c. $\text{normalcdf}(87, 1000, 80, 5) = .0807$ or 8.07%

d. $\text{invNorm}(.90, 80, 5) = 86.4$

5. Jeff did better because he was more standard deviations above his peers than Mary was in relation to her peers.

6. $r^2 = .79$, $r = .89$, $y = 17.73 + .76x$

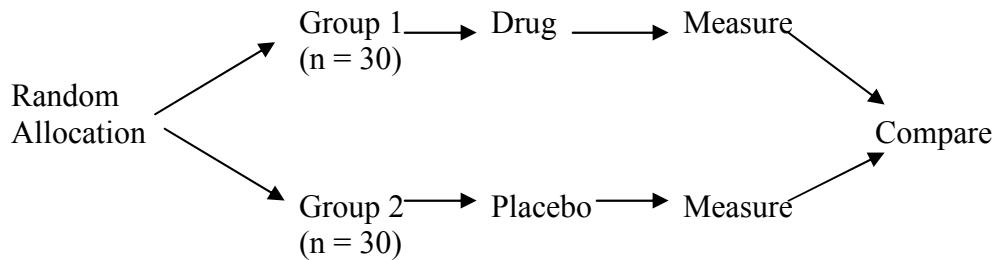
7. Yes... $r = .89$ and there is no pattern in the residual plot

8. 97.36% (r^2 value)

9. Calculate $\log y$ and test for exponential regression

10. 48% A
36% B
16% C

11.



12. Answers will vary: Use random numbers where white = 0-5, black = 6, 7 and other = 8, 9

13. The proportion of times an outcome occurs **in the long-run**

14. Mean (weighted average) = 1.776

15. a. .481

b. $X < 3$

16. $\frac{3}{10} \cdot \frac{7}{10} \cdot \frac{7}{10} \cdot 3$ ways of choosing 1 brown M&M

17. The sampling distribution would be approximately normal because of the Central Limit Theorem ($n \geq 32$).

18. $\frac{4.2}{\sqrt{50}}$

19. Yes... $N \geq 10n$, $np \geq 10$, $n(1-p) \geq 10$

20. a. P (Population/parameters), A (Assumptions), I (Interval), S (State conclusion in context)

b. P (Population/parameters), H (Hypotheses), A (Assumptions), T (Test/P-value), S (State conclusion in context)

21. a. The population is all loaves of bread produced at the bakery

b. The parameter of interest is the mean weight of these loaves of bread

c. $H_0: \mu = 1$, $H_a: \mu > 1$

T-Test: $t = 1.72$, $p = .051$

There is not (quite) enough evidence ($p = .051$) to reject H_0 so we must conclude that the mean weight of the loaves is 1 pound (as they should be).

22. a. Z-Interval: $CI = 1139.375 \pm 1.645(10) = (1123, 1156)$

b. $H_0: \mu = 1150, H_a: \mu \neq 1150$

Z-Test gives $z = -1.06$ and $p = .2880$

We fail to reject H_0 and conclude that the school's average SAT score **is** 1150.

23. $H_0: \mu = 100, H_a: \mu < 100$

T-Test: $t = -2.38, p = .032$

At $\alpha = .05$, there is sufficient evidence ($p = .032$) to reject H_0 and conclude that the average IQ of his students **is** less than 100.

24. $t^* = 2.306$ ($df = 9 - 1 = 8$)

25. 2-Sample T Interval: $CI = (27.9, 32.1)$

We are 99% confident that mean SAT math score for males is between 28 and 32 points higher than the mean score for females.

26. a. SRS, $np \geq 10, n(1-p) \geq 10$

b. $H_0: p = .40, H_a: p > .40$

1-Proportion Z Test: $z = 2.90, p = .0018 (< .01)$

We reject H_0 and conclude that Tyler's free throw shooting has improved.

27. SRS, Expected counts ≥ 1 and $80\% \geq 5$

28. Chi-square statistic = $\Sigma(O - E)^2/E = 6.66, p = .0098$

There is strong evidence ($p = .0098$) that there was an association between gender and voter participation.