STATISTICS 2023 **NAME, IN INK (print)** _____

EXAM THREE **SIGNATURE, IN INK** _____

SPRING 2019 **CWID, IN INK** _____

Once this exam is graded and returned to you retain it for grade verification.

TRUE OR FALSE. Answer with a capital T or F. (3 points each)

_____ 1. As the sample size increases the standard errors of the point estimates also increase.

_____ 2. Sample statistics calculated from observed data are used as point estimates for population parameter values.

_____ 3. The decision in a hypothesis test is whether to reject or not reject the alternative hypothesis.

_____ 4. Ten percent of the confidence intervals calculated with a 90% confidence level will not contain the population parameter estimated by the interval.

_____ 5. If the data provides a very large p-value, then a researcher would conclude that the data supports the statement in the null hypothesis.

_____ 6. The rejection region in a hypothesis test identifies the values of the test statistic that would be most likely to occur assuming the null hypothesis is true.

_____ 7. A confidence interval that estimates a population mean is centered on a point estimate for the population mean.

Use of t table. State the answer on the line. (3 points each)

_____ 8. State the value of t_o, if the $P(- t_o < t < t_o)=.95$ and the df=17.

_____ 9. $P(t < -2.262)$=?, if the n=10

_____10. What is the $P(t > 1.706)$ if df = 26?

STATE THE ANSWER. Write the answer on the line. (3 points each)

_____ 11. What is the p-value of a two-tail Z hypothesis test if the test statistic value is 1.73?

_____ 12. If a 99% confidence interval to estimate a population mean is (43.3, 90.7) what is the value of the point estimate for the population mean?

_____ 13. If a point estimate for the population mean is 182 and the bound of error for a 95% confidence interval is 18 units, then what is the 95% interval to estimate the population mean?

_____ 14. If the test statistic in a right tail Z hypothesis test is 2.55, what is the p-value for the test?

_____ 15. How many units wide is a 98% confidence interval to estimate the mean based on a sample of 28 observations with a sample standard deviation of 23.55 units? State the answer as an integer with no digits past the decimal.

_____ 16. In a right tail hypothesis test on the mean based on a sample of only 13 observations what value must the test statistic exceed if the null hypothesis is rejected at the 5% significance level?

_____ 17. How many coyotes would be required for a sample to estimate the mean body weight to within 1.2 pounds with 95% confidence if the standard deviation of the coyote body weight is known to be 3 pounds?

In a historically close governor's election in 2006, Brad Henry was elected Governor of Oklahoma with 448,133 votes, only 6,357 votes more than Steve Largent, who played 14 years of professional football with the Seattle Seahawks after graduation from University of Tulsa. Four-hundred students were questioned if they thought that there should have been a recount of votes for the gubernatorial race. One-hundred twenty students said that they thought there should have been a recount. Use this information to answer the remaining questions on this page.

_____ 18. Based on this sample what is the numerical value of the point estimate for the proportion of students who thought that there should have been a recount?

_____ 19. What is the numerical value of the estimated standard error for the point estimate for the proportion of students who thought that there should have been a recount? Round the answer to four digits past the decimal.

_____ 20. Assume that the estimated standard error for the point estimate for the proportion of students who thought that there should be a recount is 0.0125. What is the numerical value of the test statistic to test the hypothesis that more than 25% of students thought that there should have been a recount?

STATE THE ANSWER. Write the answer on the line. (3 points each)

An international agricultural company has developed a new cattle feeding ration that is advertised to produce mean weight gain of more than 52 pounds on steers in a month. Use the following data and Excel output to address the following questions.

	A	B	C	D	E	F	G	H
3	**Sample Data**					**t test**		
4								
5	45	58	72	52		hyp mean (μ)	52	
6	56	49	48	67		sample size		
7	71	52	62	56		sample mean		
8	38	39	54	52		std dev	10.31532	
9	61	42	45	46		effect size	0.1131	
10	51	34	58	68		tails	1	
11						std error		
12						df	23	
13						t-stat	0.554077	
14						p-value	0.292437	
15						alpha	0.05	
16						sig		

_____ 21. What is the sample size?

_____ 22. What is the point estimate for the mean weight gain per month for steers on this ration? Round your answer to four digits past the decimal.

_____ 23. What is the estimated standard error of the point estimate for the mean weight gain per month for steers on this ration? Round your answer to four digits past the decimal.

_____ 24. What is the value of the test statistic to test the null hypothesis that the mean weight gain for steers on this ration is equal to 52 pounds per month? Round your answer to two digits past the decimal.

_____ 25. What is the p-value to test the null hypothesis that the mean weight gain for steers on this ration is equal to 52 pounds per month versus an alternative that the mean weight gain exceeds 52 pounds per month?

_____ 26. What is the p-value to test the null hypothesis that the mean weight gain for steers on this ration is equal to 52 pounds per month versus an alternative that the mean weight gain differs from 52 pounds per month?

_____ 27. What is the value of the test statistic to test the null hypothesis that the mean weight gain for steers on this ration is equal to 50 pounds per month? This value is not provided in the output, but can be calculated from the values provided. Round your answer to 1 digit past the decimal.

HYPOTHESIS TEST QUESTIONS. State the answer on the line. (3 points each)

Assume that the distance people travel during the Easter holidays is normally distributed. A sample of 22 people is taken and the distance they traveled during the holiday season is recorded in miles. This sample of 22 produced a mean distance of 165 miles with a standard deviation of 52. Use this information to answer the questions on this page.

_____ 28. State the alternative hypothesis if the research question is, "Do the data support the idea that the mean distance traveled during the holidays differs from 145 miles?"

_____ 29. State the numerical value of the test statistic that would result from this situation. Round your answer to one digit past the decimal.

_____ 30. What is the name of the distribution that represents the set of possible test statistic values if in fact the mean distance driven during the holidays is 145 miles?

_____ 31. The null hypothesis in this situation would be rejected at the 5% level if the absolute value of the test statistic is more than what value?

_____ 32. Assume that the value of the test statistic in this situation was 3.2. What two values is the p-value between for the test statistic value of 3.2 in this situation?

_____ 33. Assume the p-value in this hypothesis test is 0.03. Would the null hypothesis be rejected at the 5% significance level in this case? Answer with a YES or NO.

STANDARD NORMAL DISTRIBUTION: Table Values Represent AREA to the LEFT of the Z score.

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.50000	.50399	.50798	.51197	.51595	.51994	.52392	.52790	.53188	.53586
0.1	.53983	.54380	.54776	.55172	.55567	.55962	.56356	.56749	.57142	.57535
0.2	.57926	.58317	.58706	.59095	.59483	.59871	.60257	.60642	.61026	.61409
0.3	.61791	.62172	.62552	.62930	.63307	.63683	.64058	.64431	.64803	.65173
0.4	.65542	.65910	.66276	.66640	.67003	.67364	.67724	.68082	.68439	.68793
0.5	.69146	.69497	.69847	.70194	.70540	.70884	.71226	.71566	.71904	.72240
0.6	.72575	.72907	.73237	.73565	.73891	.74215	.74537	.74857	.75175	.75490
0.7	.75804	.76115	.76424	.76730	.77035	.77337	.77637	.77935	.78230	.78524
0.8	.78814	.79103	.79389	.79673	.79955	.80234	.80511	.80785	.81057	.81327
0.9	.81594	.81859	.82121	.82381	.82639	.82894	.83147	.83398	.83646	.83891
1.0	.84134	.84375	.84614	.84849	.85083	.85314	.85543	.85769	.85993	.86214
1.1	.86433	.86650	.86864	.87076	.87286	.87493	.87698	.87900	.88100	.88298
1.2	.88493	.88686	.88877	.89065	.89251	.89435	.89617	.89796	.89973	.90147
1.3	.90320	.90490	.90658	.90824	.90988	.91149	.91309	.91466	.91621	.91774
1.4	.91924	.92073	.92220	.92364	.92507	.92647	.92785	.92922	.93056	.93189
1.5	.93319	.93448	.93574	.93699	.93822	.93943	.94062	.94179	.94295	.94408
1.6	.94520	.94630	.94738	.94845	.94950	.95053	.95154	.95254	.95352	.95449
1.7	.95543	.95637	.95728	.95818	.95907	.95994	.96080	.96164	.96246	.96327
1.8	.96407	.96485	.96562	.96638	.96712	.96784	.96856	.96926	.96995	.97062
1.9	.97128	.97193	.97257	.97320	.97381	.97441	.97500	.97558	.97615	.97670
2.0	.97725	.97778	.97831	.97882	.97932	.97982	.98030	.98077	.98124	.98169
2.1	.98214	.98257	.98300	.98341	.98382	.98422	.98461	.98500	.98537	.98574
2.2	.98610	.98645	.98679	.98713	.98745	.98778	.98809	.98840	.98870	.98899
2.3	.98928	.98956	.98983	.99010	.99036	.99061	.99086	.99111	.99134	.99158
2.4	.99180	.99202	.99224	.99245	.99266	.99286	.99305	.99324	.99343	.99361
2.5	.99379	.99396	.99413	.99430	.99446	.99461	.99477	.99492	.99506	.99520
2.6	.99534	.99547	.99560	.99573	.99585	.99598	.99609	.99621	.99632	.99643
2.7	.99653	.99664	.99674	.99683	.99693	.99702	.99711	.99720	.99728	.99736
2.8	.99744	.99752	.99760	.99767	.99774	.99781	.99788	.99795	.99801	.99807
2.9	.99813	.99819	.99825	.99831	.99836	.99841	.99846	.99851	.99856	.99861
3.0	.99865	.99869	.99874	.99878	.99882	.99886	.99889	.99893	.99896	.99900
3.1	.99903	.99906	.99910	.99913	.99916	.99918	.99921	.99924	.99926	.99929
3.2	.99931	.99934	.99936	.99938	.99940	.99942	.99944	.99946	.99948	.99950
3.3	.99952	.99953	.99955	.99957	.99958	.99960	.99961	.99962	.99964	.99965
3.4	.99966	.99968	.99969	.99970	.99971	.99972	.99973	.99974	.99975	.99976
3.5	.99977	.99978	.99978	.99979	.99980	.99981	.99981	.99982	.99983	.99983
3.6	.99984	.99985	.99985	.99986	.99986	.99987	.99987	.99988	.99988	.99989
3.7	.99989	.99990	.99990	.99990	.99991	.99991	.99992	.99992	.99992	.99992
3.8	.99993	.99993	.99993	.99994	.99994	.99994	.99994	.99995	.99995	.99995
3.9	.99995	.99995	.99996	.99996	.99996	.99996	.99996	.99996	.99997	.99997

t Table

cum. prob	$t_{.50}$	$t_{.75}$	$t_{.80}$	$t_{.85}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$	$t_{.999}$	$t_{.9995}$
one-tail	**0.50**	**0.25**	**0.20**	**0.15**	**0.10**	**0.05**	**0.025**	**0.01**	**0.005**	**0.001**	**0.0005**
two-tails	**1.00**	**0.50**	**0.40**	**0.30**	**0.20**	**0.10**	**0.05**	**0.02**	**0.01**	**0.002**	**0.001**
df											
1	0.000	1.000	1.376	1.963	3.078	6.314	12.71	31.82	63.66	318.31	636.62
2	0.000	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	22.327	31.599
3	0.000	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	10.215	12.924
4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	0.000	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	0.000	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	0.000	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	0.000	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	0.000	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	0.000	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	0.000	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	0.000	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	0.000	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	0.000	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	0.000	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	0.000	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	0.000	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	0.000	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	0.000	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	0.000	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	0.000	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	0.000	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.485	3.768
24	0.000	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	0.000	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	0.000	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	0.000	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	0.000	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	0.000	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	0.000	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	0.000	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	0.000	0.679	0.848	1.045	1.296	1.671	2.000	2.390	2.660	3.232	3.460
80	0.000	0.678	0.846	1.043	1.292	1.664	1.990	2.374	2.639	3.195	3.416
100	0.000	0.677	0.845	1.042	1.290	1.660	1.984	2.364	2.626	3.174	3.390
1000	0.000	0.675	0.842	1.037	1.282	1.646	1.962	2.330	2.581	3.098	3.300
z	0.000	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.090	3.291
	0%	50%	60%	70%	80%	90%	95%	98%	99%	99.8%	99.9%
	Confidence Level										