

Practice Assessment 8

Name: **Answer Key**

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Closed book/notes. Scientific calculators only.

1. (1 pt.) The distribution of $\hat{p}$ is approximately normal only when which two conditions are met?

- ① $np \leq 10$ and $n(1 - p) \leq 10$ ② $np \geq 10$ and $n(1 - p) \leq 10$
③ $np \leq 10$ and $n(1 - p) \geq 10$ ④ $np \geq 10$ and $n(1 - p) \geq 10$

Questions 2 and 3 refer to the following. To study scoring trends in the Town of Colonie Golfers' Loop, Mr. Lange selects 361 scores at random. These scores were returned between calendar-years 2015 and 2023. Assume that the population of Loop scores, in general, follow a normal distribution with mean 81.006 and standard deviation 5.658, correct to three decimal places.

2. (1 pt.) Is the sample mean normally distributed?

- ① Yes ② No

3. (8 pts.) Compute the probability that the sample mean is between 80.339 and 81.673. **A standard normal table is provided on the back of this page.**

$$P(80.339 \leq \bar{X} \leq 81.673) = P\left(\frac{80.339 - 81.006}{5.658/\sqrt{361}} \leq \frac{\bar{X} - 81.006}{5.658/\sqrt{361}} \leq \frac{81.673 - 81.006}{5.658/\sqrt{361}}\right) \quad (1)$$

$$\approx P(-2.24 \leq Z \leq 2.24) \quad (2)$$

$$= P(z \leq 2.24) - P(Z \leq -2.24) \quad (3)$$

$$\approx 0.98745 - 0.01255 \quad (4)$$

$$= 0.9749 \quad (5)$$

- +3 for (1), +2 for (2), +2 for (4), +1 for (5)

Note: This is a balanced-limits problem, and students may show the following:

$$P(80.339 \leq \bar{X} \leq 81.673) = P\left(\frac{80.339 - 81.006}{5.658/\sqrt{361}} \leq \frac{\bar{X} - 81.006}{5.658/\sqrt{361}} \leq \frac{81.673 - 81.006}{5.658/\sqrt{361}}\right) \quad (6)$$

$$\approx P(-2.24 \leq Z \leq 2.24) \quad (7)$$

$$= 1 - 2P(Z \leq -2.24) \quad (8)$$

$$\approx 1 - 2(0.01255) \quad (9)$$

$$= 0.9749 \quad (10)$$

- +3 for (6), +2 for (7), +1 each for (8) - (10)

Standard Normal Table
Table Values Represent Area to the Left of the z -score

z^*	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-4.4	0.00001	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
-4.3	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
-2.6	0.00466	0.00453	0.00440	0.00427	0.00415	0.00402	0.00391	0.00379	0.00368	0.00357
-2.5	0.00621	0.00604	0.00587	0.00570	0.00554	0.00539	0.00523	0.00508	0.00494	0.00480
-2.4	0.00820	0.00798	0.00776	0.00755	0.00734	0.00714	0.00695	0.00676	0.00657	0.00639
-2.3	0.01072	0.01044	0.01017	0.00990	0.00964	0.00939	0.00914	0.00889	0.00866	0.00842
-2.2	0.01390	0.01355	0.01321	0.01287	0.01255	0.01222	0.01191	0.01160	0.01130	0.01101
-2.1	0.01786	0.01743	0.01700	0.01659	0.01618	0.01578	0.01539	0.01500	0.01463	0.01426
-2.0	0.02275	0.02222	0.02169	0.02118	0.02068	0.02018	0.01970	0.01923	0.01876	0.01831
-1.9	0.02872	0.02807	0.02743	0.02680	0.02619	0.02559	0.02500	0.02442	0.02385	0.02330
-1.8	0.03593	0.03515	0.03438	0.03362	0.03288	0.03216	0.03144	0.03074	0.03005	0.02938
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
1.8	0.96407	0.96485	0.96562	0.96638	0.96712	0.96784	0.96856	0.96926	0.96995	0.97062
1.9	0.97128	0.97193	0.97257	0.97320	0.97381	0.97441	0.97500	0.97558	0.97615	0.97670
2.0	0.97725	0.97778	0.97831	0.97882	0.97932	0.97982	0.98030	0.98077	0.98124	0.98169
2.1	0.98214	0.98257	0.98300	0.98341	0.98382	0.98422	0.98461	0.98500	0.98537	0.98574
2.2	0.98610	0.98645	0.98679	0.98713	0.98745	0.98778	0.98809	0.98840	0.98870	0.98899
2.3	0.98928	0.98956	0.98983	0.99010	0.99036	0.99061	0.99086	0.99111	0.99134	0.99158
2.4	0.99180	0.99202	0.99224	0.99245	0.99266	0.99286	0.99305	0.99324	0.99343	0.99361
2.5	0.99379	0.99396	0.99413	0.99430	0.99446	0.99461	0.99477	0.99492	0.99506	0.99520
2.6	0.99534	0.99547	0.99560	0.99573	0.99585	0.99598	0.99609	0.99621	0.99632	0.99643
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
4.3	0.99999	0.99999	0.99999	0.99999	0.99999	0.99999	0.99999	0.99999	0.99999	0.99999
4.4	0.99999	0.99999	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000