

Quiz 7A

Name: **Answer Key**

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Closed book/notes. Scientific calculators only. Correct answers and all work must be shown to receive full credit.

1. (1 pt.) Suppose a random sample of size $n \geq 30$ is chosen from a population with mean μ and standard deviation σ . Also suppose n is no more than 10% of the population size. Which of the following is the correct approximation for the standard deviation of $\bar{x}$?

(A) $\frac{\sigma^2}{n}$

(C) $\frac{\sigma}{\sqrt{n-1}}$

(B) $\frac{\sigma^2}{n-1}$

(D) $\frac{\sigma}{\sqrt{n}}$

Questions 2-4 are based on the following. Assume x has a normal distribution with mean 75.354 and standard deviation 2.536, and suppose z has a standard normal distribution. Find each probability and express to *five* decimal places. A *standard normal table is provided for you on the back of this page*.

2. (5 pts.) $P(70.155 \leq x \leq 80.553)$ **Award:**

- One point (no partial credit) for (1). Allow z to be given in the middle.
- One point for (2). No partial credit should be awarded here since this is a “balanced-limits problem” where the lower limit equals -1 times the upper limit.
- Two points for (4) (one point for each part).
- One point for (5).

The table on the next page shows how to obtain (4) in red.

$$P(70.155 \leq x \leq 80.553) = P\left(\frac{70.155 - 75.354}{2.536} \leq \frac{x - 75.354}{2.536} \leq \frac{80.553 - 75.354}{2.536}\right) \quad (1)$$

$$\approx P(-2.05 \leq z \leq 2.05) \quad (2)$$

$$= P(z \leq 2.05) - P(z \leq -2.05) \quad (3)$$

$$\approx 0.97982 - 0.02018 \quad (4)$$

$$= 95.964\% \quad (5)$$

3. (1 pt.) $P(z < 1.52) \approx 93.574\%$. The table on the next page shows how to obtain this in blue.
4. (3 pts.) $P(z \geq 1.38)$ Award one point for each step shown on the left-hand side of the page. If the student shows the right-hand side, award two points for (6) and one point for (7). The table on the next page shows how to obtain (7) in green.

$$P(z \geq 1.38) = 1 - P(z \leq 1.38) \quad P(z \geq 1.38) = P(z \leq -1.38) \quad (6)$$

$$\approx 1 - 0.91621 \quad \approx 8.379\% \quad (7)$$

$$= 8.379\% \quad (8)$$

Standard Normal Table

z^*	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-4.4	.00001	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
-4.3	.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
-2.2	.01390	0.01355	0.01321	0.01287	0.01255	0.01222	0.01191	0.01160	0.01130	0.01101
-2.1	.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
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
-1.5	0.06681	0.06552	0.06426	0.06301	0.06178	0.06057	0.05938	0.05821	0.05705	0.05592
-1.4	0.08076	0.07927	0.07780	0.07636	0.07493	0.07353	0.07215	0.07078	0.06944	0.06811
-1.3	0.09680	0.09510	0.09342	0.09176	0.09012	0.08851	0.08691	0.08534	0.08379	0.08226
-1.2	0.11507	0.11314	0.11123	0.10935	0.10749	0.10565	0.10383	0.10204	0.10027	0.09853
-1.1	0.13567	0.13350	0.13136	0.12924	0.12714	0.12507	0.12302	0.12100	0.11900	0.11702
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
1.1	0.86433	0.86650	0.86864	0.87076	0.87286	0.87493	0.87698	0.87900	0.88100	0.88298
1.2	0.88493	0.88686	0.88877	0.89065	0.89251	0.89435	0.89617	0.89796	0.89973	0.90147
1.3	0.90320	0.90490	0.90658	0.90824	0.90988	0.91149	0.91309	0.91466	0.91621	0.91774
1.4	0.91924	0.92073	0.92220	0.92364	0.92507	0.92647	0.92785	0.92922	0.93056	0.93189
1.5	0.93319	0.93448	0.93574	0.93699	0.93822	0.93943	0.94062	0.94179	0.94295	0.94408
1.6	0.94520	0.94630	0.94738	0.94845	0.94950	0.95053	0.95154	0.95254	0.95352	0.95459
1.7	0.95543	0.95637	0.95728	0.95818	0.95907	0.95994	0.96080	0.96164	0.96246	0.96327
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
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
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