

Lab 8 Practice Problems

From the rhanes data set $\mu = 106.7842$ and $\sigma = 35.8276$.

$$\textcircled{1} \quad x = 123 \quad \text{so} \quad z = \frac{123 - 106.7842}{35.8276} = 0.4526$$

We want $P(Z > 0.45)$.

$$P(Z > 0.45) = 1 - P(Z < 0.45) = 1 - 0.674 = 0.326$$

Answer: 32.6%

$$\textcircled{2} \quad x_1 = 118 \quad \text{so} \quad z_1 = \frac{118 - 106.7842}{35.8276} = 0.313$$

$$x_2 = 126 \quad \text{so} \quad z_2 = \frac{126 - 106.7842}{35.8276} = 0.5363$$

We want $P(0.313 < Z < 0.54)$.

$$\begin{aligned} P(0.313 < Z < 0.5363) &= P(Z > 0.54) - P(Z > 0.31) \\ &= 0.705 - 0.622 = 0.083 \end{aligned}$$

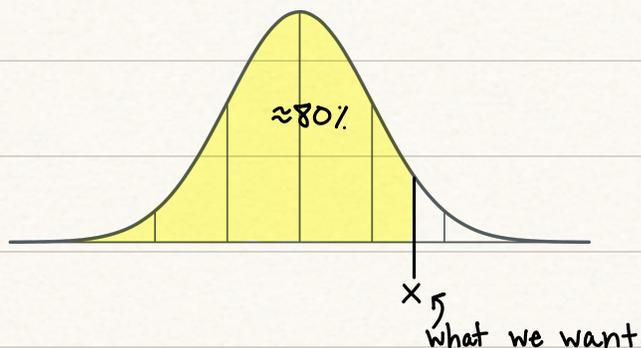
Answer: 8.3%

$$\textcircled{3} \quad z = 0.84 \quad \text{from table}$$

$$z = \frac{x - \mu}{\sigma} \Rightarrow x = \mu + z\sigma$$

$$= 106.7842 + 0.84(35.8276)$$

$$= 136.8794$$



Answer: $x = 136.8794$

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We want to see how probable $\bar{x}=123$ is when $n=50$.

Sample mean \Rightarrow use CLT

$$Z = \frac{\bar{x} - \mu}{SE} \quad \text{where } SE = \frac{35.8276}{\sqrt{50}} = 5.0668$$

$$= \frac{123 - 106.7842}{5.0668} = 3.2$$

$$P(Z > 3.2) = 1 - P(Z < 3.2)$$

$$= 1 - 0.999 = 0.001$$

Answer: $\approx 0.1\%$

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Use CLT again.

$$Z_1 = \frac{118 - 106.7842}{5.0668} = 2.21 \quad Z_2 = \frac{126 - 106.7842}{5.0668} = 3.8$$

$$P(Z_1 < Z < Z_2) = P(Z > 3.8) - P(Z > 2.21)$$

$$= 1 - 0.986 = 0.014$$

Answer: 1.4%

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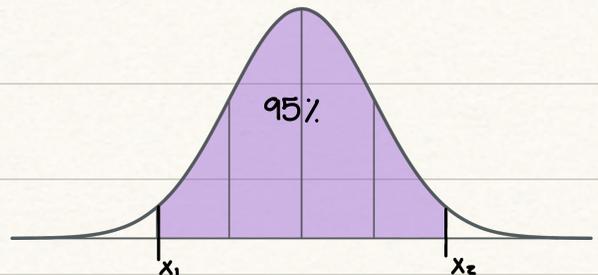
$$Z_1 = -1.96 \quad Z_2 = 1.96$$

$$Z = \frac{X - \mu}{SE} \Rightarrow X = \mu + ZSE$$

$$X_1 = 106.7842 - 1.96(5.0668) = 96.85$$

$$X_2 = 106.7842 + 1.96(5.0668) = 116.72$$

Answer: lower bound = 96.85 upper bound = 116.72

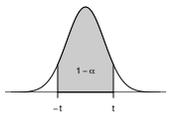


Area to the left of z under the normal curve. The rows represent the tens digit of z and the columns represent the hundreds digit. So, for instance, to find the area to the left of 1.23, go down to the "1.2" row and over to the ".03" column, and find the answer: 0.891.

z	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-3.4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-3.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-3.2	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
-3.1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
-3	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
-2.9	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001
-2.8	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
-2.7	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
-2.6	0.005	0.005	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
-2.5	0.006	0.006	0.006	0.006	0.006	0.005	0.005	0.005	0.005	0.005
-2.4	0.008	0.008	0.008	0.008	0.007	0.007	0.007	0.007	0.007	0.006
-2.3	0.011	0.010	0.010	0.010	0.010	0.009	0.009	0.009	0.009	0.008
-2.2	0.014	0.014	0.013	0.013	0.013	0.012	0.012	0.012	0.011	0.011
-2.1	0.018	0.017	0.017	0.017	0.016	0.016	0.015	0.015	0.015	0.014
-2	0.023	0.022	0.022	0.021	0.021	0.020	0.020	0.019	0.019	0.018
-1.9	0.029	0.028	0.027	0.027	0.026	0.026	0.025	0.024	0.024	0.023
-1.8	0.036	0.035	0.034	0.034	0.033	0.032	0.031	0.031	0.030	0.029
-1.7	0.045	0.044	0.043	0.042	0.041	0.040	0.039	0.038	0.038	0.037
-1.6	0.055	0.054	0.053	0.052	0.051	0.049	0.048	0.047	0.046	0.046
-1.5	0.067	0.066	0.064	0.063	0.062	0.061	0.059	0.058	0.057	0.056
-1.4	0.081	0.079	0.078	0.076	0.075	0.074	0.072	0.071	0.069	0.068
-1.3	0.097	0.095	0.093	0.092	0.090	0.089	0.087	0.085	0.084	0.082
-1.2	0.115	0.113	0.111	0.109	0.107	0.106	0.104	0.102	0.100	0.099
-1.1	0.136	0.133	0.131	0.129	0.127	0.125	0.123	0.121	0.119	0.117
-1	0.159	0.156	0.154	0.152	0.149	0.147	0.145	0.142	0.140	0.138
-0.9	0.184	0.181	0.179	0.176	0.174	0.171	0.169	0.166	0.164	0.161
-0.8	0.212	0.209	0.206	0.203	0.200	0.198	0.195	0.192	0.189	0.187
-0.7	0.242	0.239	0.236	0.233	0.230	0.227	0.224	0.221	0.218	0.215
-0.6	0.274	0.271	0.268	0.264	0.261	0.258	0.255	0.251	0.248	0.245
-0.5	0.309	0.305	0.302	0.298	0.295	0.291	0.288	0.284	0.281	0.278
-0.4	0.345	0.341	0.337	0.334	0.330	0.326	0.323	0.319	0.316	0.312
-0.3	0.382	0.378	0.374	0.371	0.367	0.363	0.359	0.356	0.352	0.348
-0.2	0.421	0.417	0.413	0.409	0.405	0.401	0.397	0.394	0.390	0.386
-0.1	0.460	0.456	0.452	0.448	0.444	0.440	0.436	0.433	0.429	0.425
0	0.500	0.496	0.492	0.488	0.484	0.480	0.476	0.472	0.468	0.464
0.1	0.500	0.504	0.508	0.512	0.516	0.520	0.524	0.528	0.532	0.536
0.2	0.540	0.544	0.548	0.552	0.556	0.560	0.564	0.567	0.571	0.575
0.3	0.579	0.583	0.587	0.591	0.595	0.599	0.603	0.606	0.610	0.614
0.4	0.618	0.622	0.626	0.629	0.633	0.637	0.641	0.644	0.648	0.652
0.5	0.655	0.659	0.663	0.666	0.670	0.674	0.677	0.681	0.684	0.688
0.6	0.691	0.695	0.698	0.702	0.705	0.709	0.712	0.716	0.719	0.722
0.7	0.726	0.729	0.732	0.736	0.739	0.742	0.745	0.749	0.752	0.755
0.8	0.758	0.761	0.764	0.767	0.770	0.773	0.776	0.779	0.782	0.785
0.9	0.788	0.791	0.794	0.797	0.800	0.802	0.805	0.808	0.811	0.813
1	0.816	0.819	0.821	0.824	0.826	0.829	0.831	0.834	0.836	0.839
1.1	0.841	0.844	0.846	0.848	0.851	0.853	0.855	0.858	0.860	0.862
1.2	0.864	0.867	0.869	0.871	0.873	0.875	0.877	0.879	0.881	0.883
1.3	0.885	0.887	0.889	0.891	0.893	0.894	0.896	0.898	0.900	0.901
1.4	0.903	0.905	0.907	0.908	0.910	0.911	0.913	0.915	0.916	0.918
1.5	0.919	0.921	0.922	0.924	0.925	0.926	0.928	0.929	0.931	0.932
1.6	0.933	0.934	0.936	0.937	0.938	0.939	0.941	0.942	0.943	0.944
1.7	0.945	0.946	0.947	0.948	0.949	0.951	0.952	0.953	0.954	0.954
1.8	0.955	0.956	0.957	0.958	0.959	0.960	0.961	0.962	0.962	0.963
1.9	0.964	0.965	0.966	0.966	0.967	0.968	0.969	0.969	0.970	0.971
2	0.971	0.972	0.973	0.973	0.974	0.974	0.975	0.976	0.976	0.977
2.1	0.977	0.978	0.978	0.979	0.979	0.980	0.980	0.981	0.981	0.982
2.2	0.982	0.983	0.983	0.983	0.984	0.984	0.985	0.985	0.985	0.986
2.3	0.986	0.986	0.987	0.987	0.987	0.988	0.988	0.988	0.989	0.989
2.4	0.989	0.990	0.990	0.990	0.990	0.991	0.991	0.991	0.991	0.992
2.5	0.992	0.992	0.992	0.992	0.992	0.993	0.993	0.993	0.993	0.994
2.6	0.994	0.994	0.994	0.994	0.994	0.995	0.995	0.995	0.995	0.995
2.7	0.995	0.995	0.996	0.996	0.996	0.996	0.996	0.996	0.996	0.996
2.8	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.997
2.9	0.997	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.998
3	0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.999	0.999	0.999
3.1	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
3.2	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
3.3	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
3.4	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Some convenient quantiles:

α	z
0.01	2.58
0.05	1.96
0.1	1.64
0.2	1.28
0.25	1.15



3.9 ≈ 1.000