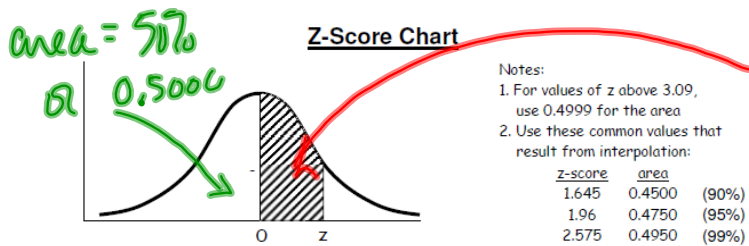


Z-Scores + the Half-Curve Chart

Not all z-score charts are the same ... but every one has a diagram that explains the meaning of the numbers in the chart



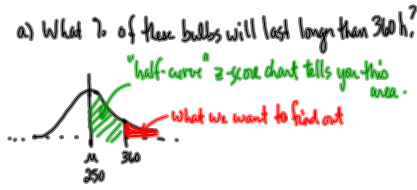
This "half-curve" chart gives the area above the mean

The Standard Normal (z) Distribution

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879

↑ 90's in decimal form

Example: Everite produces a "green" lightbulb with a $N(250, 50)$ distribution for hours of life.



Find the z-score: $Z = \frac{X - \mu}{\sigma}$

$$Z = \frac{360 - 250}{50}$$

$$Z = \frac{110}{50}$$

$$Z = 2.2$$

look up 2.2 on the 1/2 curve.

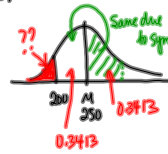
	0.0	0.01	0.02	0.03	0.04	0.05
2.0	4772	4778	4783	4788	4793	4798
2.1	4821	4826	4830	4834	4838	4842
2.2	4884	4884	4888	4891	4895	4898
2.3	4937	4937	4940	4943	4946	4949
2.4	4987	4987	4990	4993	4996	4999

50% is above the mean

$$50\% - 48.61\% = 1.39\%$$

1.39% of the light bulbs will last more than 360h.

b) What % will last less than 200h?



$$Z = \frac{X - \mu}{\sigma}$$

$$Z = \frac{200 - 250}{50}$$

$$Z = -1$$

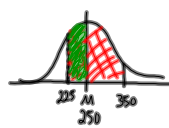
	0.00	0.01	0.02	0.03	0.04
1.0	2419	2448	2479	2510	2542
1.1	2643	2673	2704	2735	2767
1.2	2940	2970	3000	3030	3060
1.3	3324	3354	3384	3413	3443
1.4	3709	3739	3769	3798	3828

This "half-curve" chart doesn't show negative z-scores. So we use the +s col and use the symmetry.

$$50\% - 34.13\% = 15.87\%$$

You would expect there to be 15.87% of the light bulbs lasting less than 200h.

c) What is the probability that a randomly selected light bulb will last between 225 and 350h?



$$Z = \frac{X - \mu}{\sigma} = \frac{225 - 250}{50} = -0.5$$

$$Z = \frac{350 - 250}{50} = 2$$

Using the chart:



	0.00	0.01	0.02	0.03	0.04
2.0	4772	4778	4783	4788	4793
2.1	4821	4826	4830	4834	4838
2.2	4884	4884	4888	4891	4895
2.3	4937	4937	4940	4943	4946
2.4	4987	4987	4990	4993	4996

	0.00	0.01	0.02	0.03	0.04
0.5	1915	1950	1985	2019	2054
0.6	2207	2239	2271	2304	2337
0.7	2580	2611	2642	2673	2704
0.8	2881	2910	2939	2967	2995
0.9	3199	3216	3232	3248	3264

% between 225 and 350 h:

$$47.72\% - 19.15\% = 28.57\%$$

There is a 28.57% chance of the light bulb lasting between 225 and 350h.