Example:
If $z = 1.96$, then
$P(0 \text{ to } z) = 0.4750$.

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990

Table 5.6

Partial Table C.1 for Obtaining a Cumulative Area Below –3 Z Units

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
–3.0	0.00135	0.00131	0.00126	0.00122	0.00118	0.00114	0.00111	0.00107	0.00103	0.00100

Source: Extracted from Table C.1

Table 5.7

Partial Table C.1 for Obtaining a Cumulative Area Below +3 Z Units

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
+3.0	0.99865	0.99869	0.99874	0.99878	0.99882	0.99886	0.99889	0.99893	0.99897	0.99900

Source: Extracted from Table C.1

Table 5.9

Partial Table C.1 for Finding Z Value That Corresponds to a Cumulative Area of 0.025

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
−2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
−1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233

Table 5.10

Partial Table C.1 for Finding Z Value That Corresponds to a Cumulative Area of 0.975

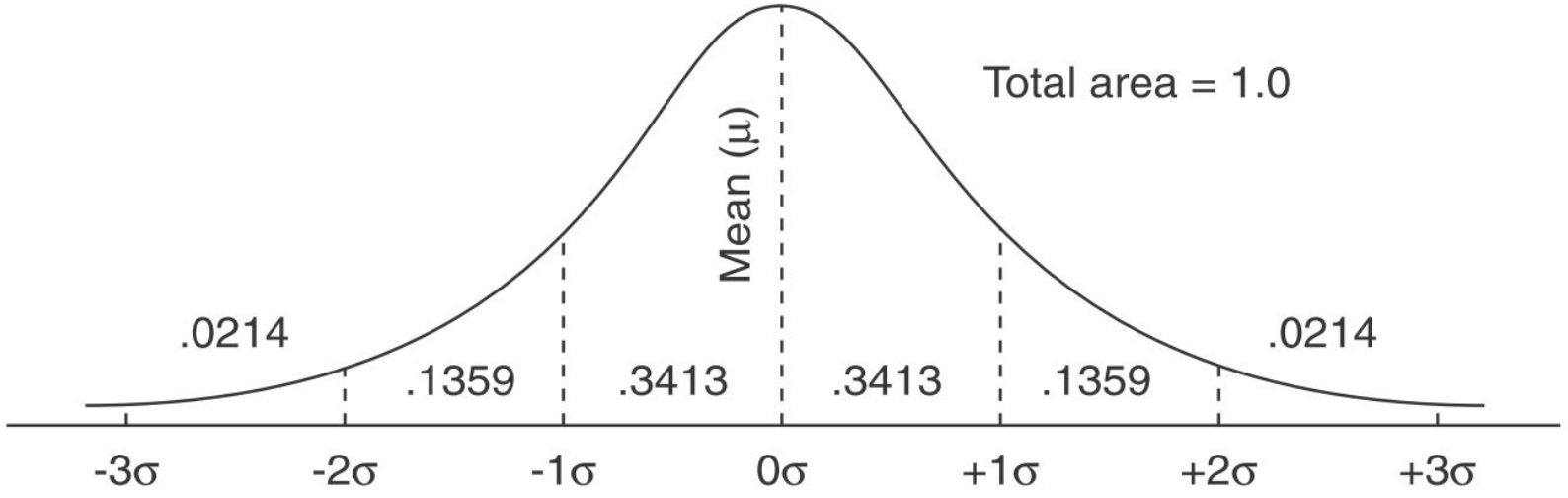
Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817

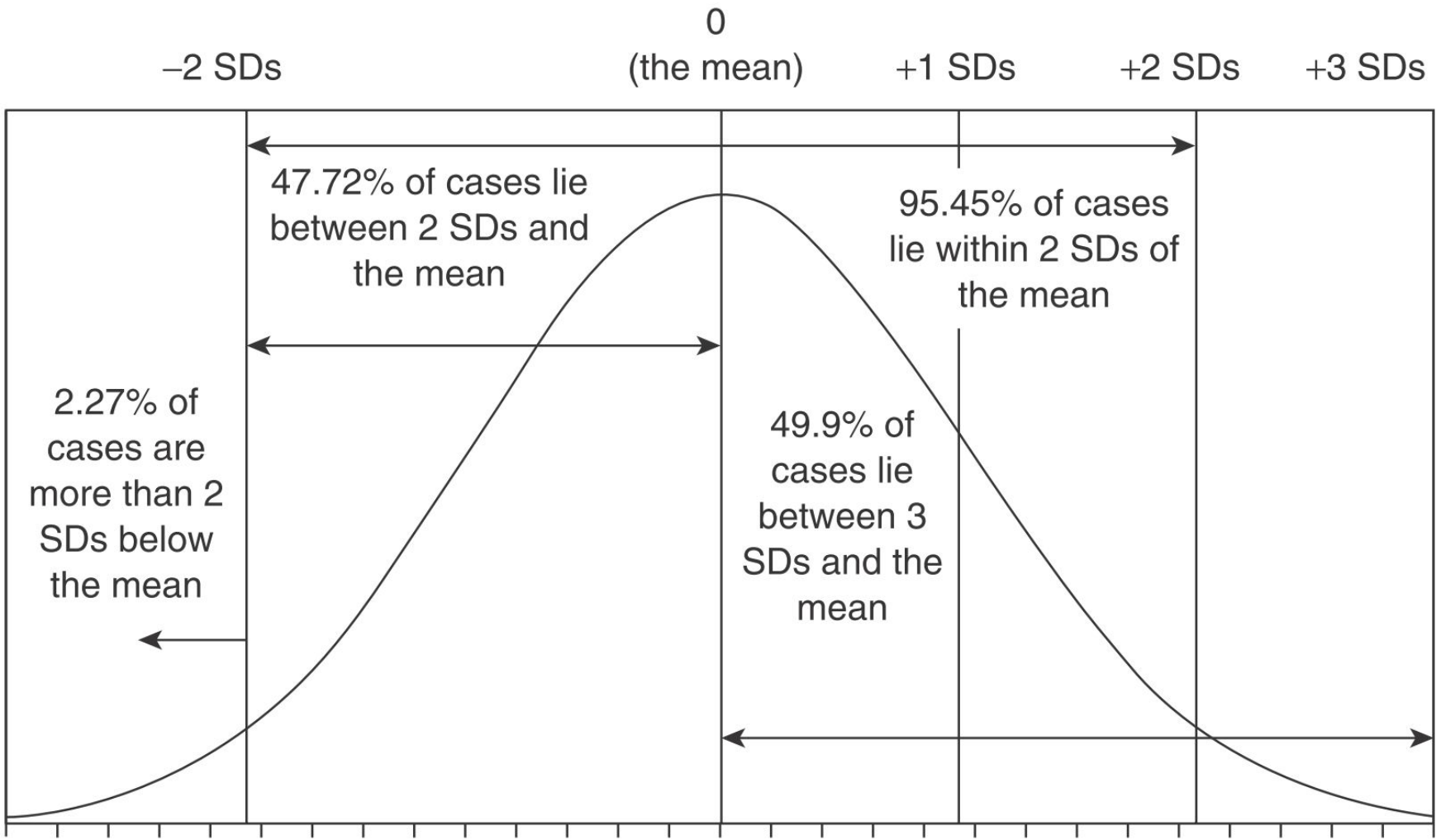
Table 5.8

Normal Probabilities for Selected Number of Standard Deviation Units

Standard Deviation Unit Ranges	Probability or Area Outside These Units	Probability or Area Within These Units
-1σ to $+1\sigma$	0.3174	0.6826
-2σ to $+2\sigma$	0.0455	0.9545
-3σ to $+3\sigma$	0.0027	0.9973
-6σ to $+6\sigma$	0.000000002	0.999999998

Figure 5–4 The normal curve and the area under the curve between σ units.




0
(the mean)
–2 SDs
+1 SDs
+2 SDs
+3 SDs
47.72% of cases lie between 2 SDs and the mean
95.45% of cases lie within 2 SDs of the mean
2.27% of cases are more than 2 SDs below the mean
49.9% of cases lie between 3 SDs and the mean

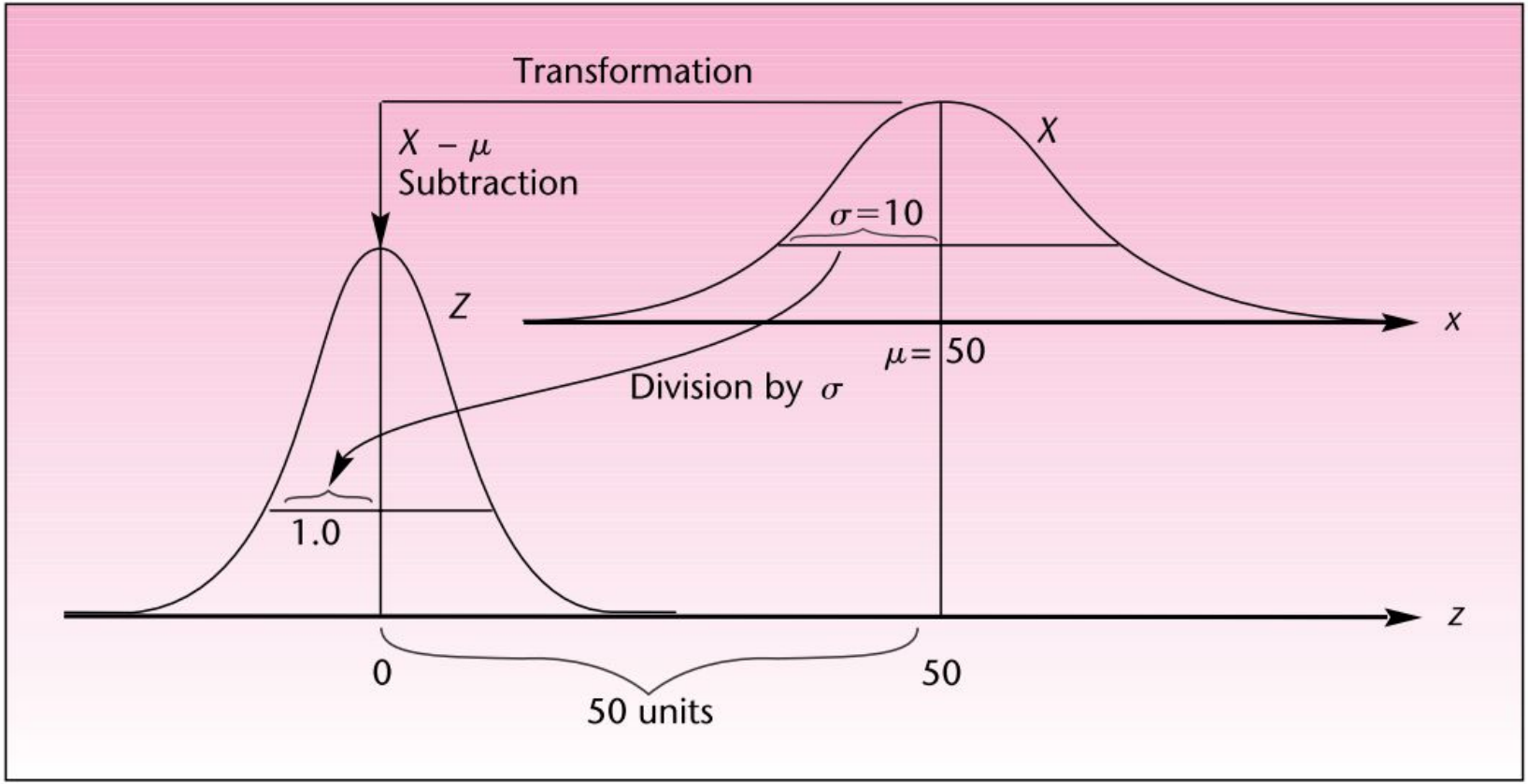
The transformation of X to Z:

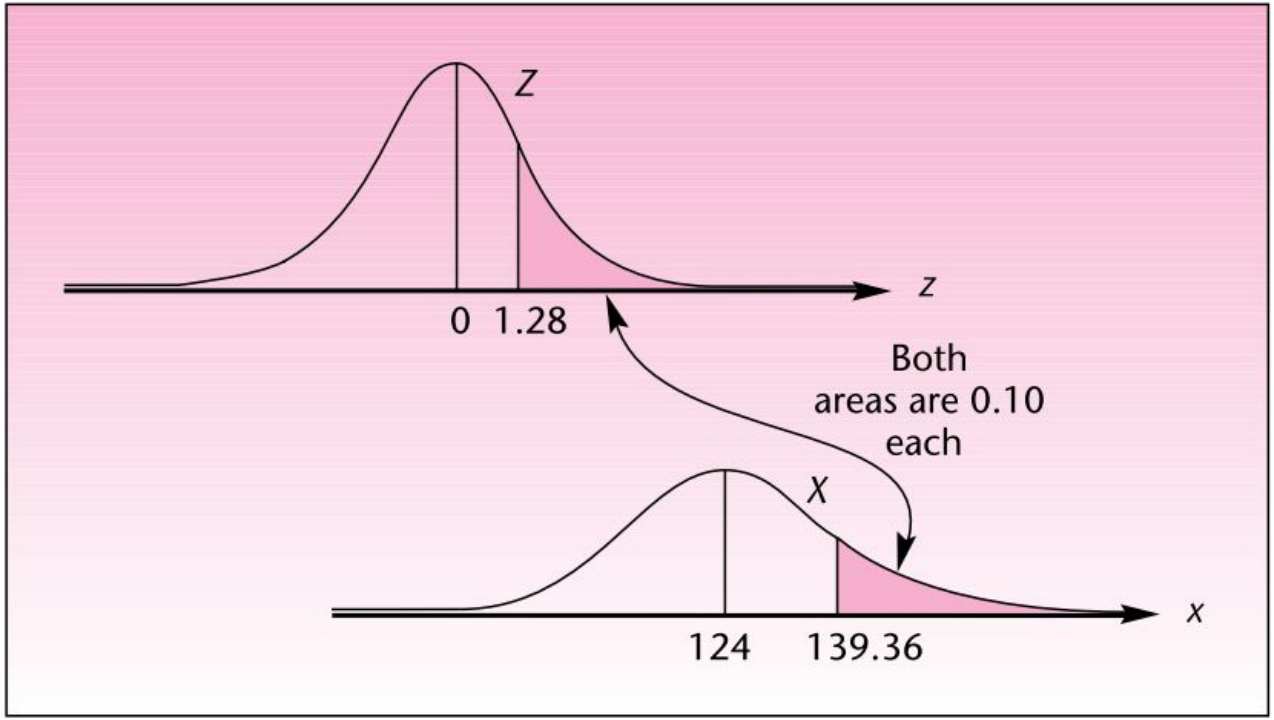
$$Z = \frac{X - \mu}{\sigma} \tag{4–5}$$

The inverse transformation of Z to X:

$$X = \mu + Z\sigma \tag{4–6}$$

FIGURE 4–10 Transforming a Normal Random Variable with Mean 50 and Standard Deviation 10 into the Standard Normal Random Variable





$$x = \mu + z\sigma = 124 + (1.28)(12) = 139.36$$

The weekly incomes of shift foremen in the glass industry are normally distributed with a mean of \$1,000 and a standard deviation of \$100. What is the z value for the income X of a foreman who earns \$1,100 per week? For a foreman who earns \$900 per week?

Using formula (7–5), the z values for the two X values (\$1,100 and \$900) are:

For $X = \$1{,}100$:

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

$$= \frac{\$1{,}100 - \$1{,}000}{\$100}$$

$$= 1.00$$

For $X = \$900$:

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

$$= \frac{\$900 - \$1{,}000}{\$100}$$

$$= -1.00$$

The z of 1.00 indicates that a weekly income of \$1,100 is one standard deviation above the mean, and a z of -1.00 shows that a \$900 income is one standard deviation below the mean. Note that both incomes (\$1,100 and \$900) are the same distance (\$100) from the mean.

Test yourself 2

Fill in the blanks in the following table:

	Score	*Mean*	*SD*	*z-Score*	*% of people above score*
1.	10	20	5	–2	98
2.	50	35	15		
3.	12	10		2	
4.	145		15	3	
5.		10	2	0.5	
6.	25		17.3		50
7.		30	5	1	
8.	12		2		84

Answers are given at the end of the chapter.

Test yourself 2

	Score	Mean	SD	*z*-Score	% of people above score
1.	10	20	5	–2	98
2.	50	35	15	1	16
3.	12	10	1	2	2
4.	145	100	15	3	0
5.	11	10	2	0.5	69
6.	25	25	17.3	0	50
7.	25	30	5	1	16
8.	12	14	2	–1	84