Example 4 Bone Density Test

Using the same bone density test from Example 3, find the probability that a randomly selected person has a result above −1.00. A value above −1.00 is considered to be in the "normal" range of bone density readings.

Solution

We again find the desired *probability* by finding a corresponding *area*. We are looking for the area of the region to the right of $z = -1.00$ that is shaded in Figure 6-6. The accompanying STATDISK display shows that the area to the right of $z = -1.00$ is 0.841345.

If we use Table A-2, we should know that it is designed to apply only to cumulative areas from the *left*. Referring to the page with *negative z* scores, we find that the cumulative area from the left up to $z = -1.00$ is 0.1587 as shown in Figure 6-6. Because the total area under the curve is 1, we can find the shaded area by subtracting 0.1587 from 1. The result is 0.8413. Even though Table A-2 is designed only for cumulative areas from the left, we can use it to find cumulative areas from the right, as shown in Figure 6-6.

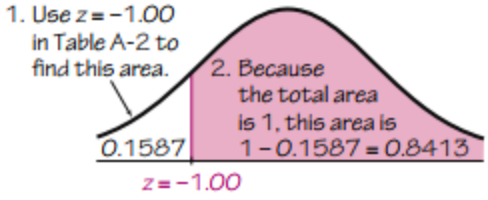
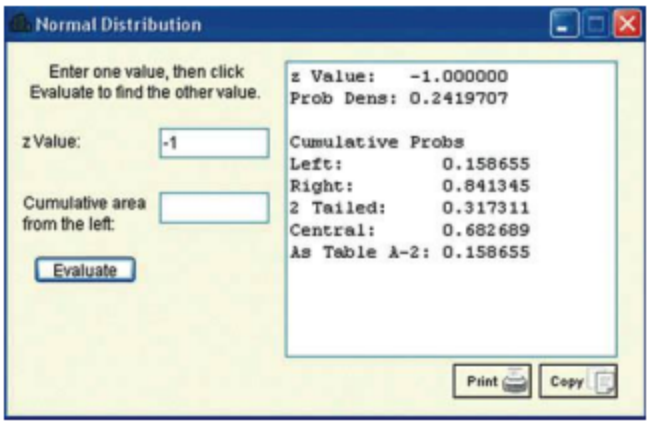


Figure 6-6 Finding the Area above z

STATDISK



Interpretation

Because of the correspondence between probability and area, we conclude that the *probability* of randomly selecting someone with a bone density reading above −1 is 0.8413 (which is the *area* to the right of $z = -1.00$). We might also say that 84.13% of people have bone density levels above −1.00.

Example 4 illustrates a way that Table A-2 can be used indirectly to find a cumulative area from the right. The following example illustrates another way that we can find an area indirectly by using Table A-2.