**3.28 Standard Normal drill**. Use [**Table A**](http://www.macmillanhighered.com/BrainHoney/Resource/6710/ebooks.bfwpub.com/bps7e/FREE144_SE_APPA-E_697-704.pdf) to find the proportion of observations from a standard Normal distribution that falls in each of the following regions. In each case, sketch a standard Normal curve and shade the area representing the region.

(a)*z* ≤ −2.15

(b)*z* ≥ −2.15

(c)*z* > 1.57

(d)−2.15 < *z* < 1.57

**3.32 Runners**. In a study of exercise, a large group of male runners walk on a treadmill for 6 minutes. Their heart rates in beats per minute at the end vary from runner to runner according to the *N*(104, 12.5) distribution. The heart rates for male nonrunners after the same exercise have the *N*(130, 17) distribution.

(a)What percent of the runners have heart rates above 135?

(b)What percent of the nonrunners have heart rates above 135?

**3.33 A milling machine**. Automated manufacturing operations are quite precise but still vary, often with distributions that are close to Normal. The width in inches of slots cut by a milling machine follows approximately the *N*(0.8750, 0.0012) distribution. The specifications allow slot widths between 0.8725 and 0.8775 inch. What proportion of slots meet these specifications?

[http://www.macmillanhighered.com/BrainHoney/Resource/6710/ebooks.bfwpub.com/bps7e/pics/show_answer.gif](javascript:opener.ToggleSolution('pq33',this.document))

**3.34 Body mass index**. Your body mass index (BMI) is your weight in kilograms divided by the square of your height in meters. Many online BMI calculators allow you to enter weight in pounds and height in inches. High BMI is a common but controversial indicator of overweight or obesity. A study by the National Center for Health Statistics found that the BMI of American young men (ages 20 to 29) is approximately Normal with mean 26.8 and standard deviation 5.2.[**11**](javascript:ShowFootnote('3_11',true))

(a)People with BMI less than 18.5 are often classified as “underweight.” What percent of men aged 20 to 29 are underweight by this criterion?

(b)People with BMI over 30 are often classified as “obese.” What percent of men aged 20 to 29 are obese by this criterion?

**3.42 Weights aren’t Normal**. The heights of people of the same sex and similar ages follow a Normal distribution reasonably closely. Weights, on the other hand, are not Normally distributed. The weights of women aged 20 to 29 in the United States have mean 161.9 pounds and median 149.4 pounds. The first and third quartiles are 126.3 pounds and 181.2 pounds. What can you say about the shape of the weight distribution? Why?

**3.44 Grading managers**. Some companies “grade on a bell curve” to compare the performance of their managers and professional workers. This forces the use of some low performance ratings so that not all workers are listed as “above average.” Ford Motor Company’s “performance management process” for this year assigned 10% A grades, 80% B grades, and 10% C grades to the company’s managers. Suppose Ford’s performance scores really are Normally distributed. This year, managers with scores less than 25 received C grades and those with scores above 475 received A grades. What are the mean and standard deviation of the scores?