EXERCISES 10

1. Using Z-Table find the proportion of observations from a standard Normal distribution that satisfies each of the following statements. In each case, sketch a standard Normal curve and shade the area under the curve that is the answer to the question.
(a) $Z > 1.65$
(b) $Z < 1.65$
(c) $Z > -0.76$
(d) $-0.76 < Z < 1.65$

2.Using Z-Table find the proportion of observations from a standard Normal distribution for each of the following events. In each case, sketch a standard Normal curve and shade the area representing the proportion.
(a) $Z \leq -1.8$
(b) $Z \geq -1.8$
(c) $Z > 1.6$
(d) $-1.8 < Z < 1.6$

3.Find the value z of a standard Normal variable Z that satisfies each of the following conditions. (report the value of z that comes closest to satisfying the condition.) In each case, sketch a standard Normal curve with your value of z marked on the axis.
(a) 22% of the observations fall below z.
(b) 40% of the observations fall above z.

4. The variable Z has a standard Normal distribution.
(a) Find the number z that has cumulative proportion 0.65.
(b) Find the number z such that the event $Z > z$ has proportion 0.45.

5.The Wechsler Adult Intelligence Scale (WAIS) is the most common IQ test. The scale of scores is set separately for each age group and is approximately Normal with mean 100 and standard deviation 15. People with WAIS scores below 70 are considered mentally retarded when, for example, applying for Social Security disability benefits. What percent of adults are retarded by this criterion?

There are two major tests of readiness for college, the ACT and the SAT. ACT scores are reported on a scale from 1 to 36. The distribution of ACT scores are approximately Normal with mean $\mu = 21.5$ *and standard deviation* $\sigma = 5.4$. *SAT scores are reported on a scale from 600 to 2400. The SAT scores are approximately Normal with mean* $\mu = 1509$ *and standard deviation* $\sigma = 321$. *Exercises 6 to 9 are based on this information.*

6.The Wechsler Adult Intelligence Scale (WAIS) is the most common IQ test. The scale of scores is set separately for each age group and is approximately Normal

with mean 100 and standard deviation 15. The organization MENSA, which calls itself "the high IQ society," requires a WAIS score of 130 or higher for membership. What percent of adults would qualify for membership?

7. Tonya scores 1820 on the SAT. Jermaine scores 29 on the ACT. Assuming that both tests measure the same thing, who has the higher score? Report the *z*-scores for both students.

8. Jose scores 2080 on the SAT. Assuming that both tests measure the same thing, what score on the ACT is equivalent to Jose's SAT score?

9. Reports on a student's ACT or SAT usually give the percentile as well as the actual score. The percentile is just the cumulative proportion stated as a percent: the percent of all scores that were lower than this one. Maria scores 2090 on the SAT. What is her percentile?

10. High-density lipoprotein (HDL) is sometimes called the "good cholesterol" because low values are associated with a higher risk of heart disease. According to the American Heart Association, people over the age of 20 years should have at least 40 mg/dL of HDL cholesterol. U.S. women aged 20 and over have a mean HDL of 55 mg/dL with a standard deviation of 15.5 mg/dL. Assume that the distribution is Normal.
(a) What percent of women have low values of HDL (40 mg/dL or less)?
(b) HDL levels of 60 mg/dL are believed to protect people from heart disease. What percent of women have protective levels of HDL?
(c) Women with more than 40 mg/dL but less than 60 mg/dL of HDL are in the intermediate range, neither very good or very bad. What proportion are in this category?

11. HDL cholesterol levels for men have a mean of 46 mg/dL with a standard deviation of 13.6. Answer the questions given in the previous exercise for the population of men.

Answers
1. (a) 0.0495. **(b)** 0.9505.**(c)** 0.7764. **(d)** 0.7269.
2. (a) 0.0359. **(b)** 0.9641.**(c)** 0.0548. **(d)** 0.9093.
3. (a) −0.7722. **(b)** 0.2533
4. (a) 0.3853. **(b)** 0.1257
5. about 2.5% .
6. 2.5%
7. Tonya's - 0.9688, Jermaine's - 1.3889.
8. 31.1≈31
9. 96.5%
10. (a) 16.60% **(b)** 37.45% **(c)** 46.95%
11. (a) 33% **(b)** 15.15% **(c)** 51.85%